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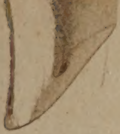

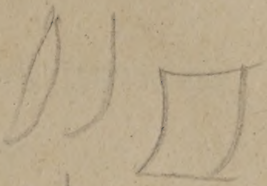

CWS.

LUNAR AND HORARY
TABLES,

FOR

NEW AND CONCISE METHODS

OF PERFORMING

THE CALCULATIONS NECESSARY FOR ASCERTAINING

THE LONGITUDE

BY

LUNAR OBSERVATIONS, OR CHRONOMETERS;

WITH

AN APPENDIX,

CONTAINING

DIRECTIONS FOR ACQUIRING A KNOWLEDGE OF THE PRINCIPAL
FIXED STARS.

BY DAVID THOMSON,
INVENTOR OF THE LONGITUDE SCALE.

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PREFACE.

In the composition of this work, the principal object has been, to furnish Navigators with short and convenient methods of performing the necessary calculations, in the practice of ascertaining the Longitude by Lunar Observations, or Chronometers.

In finding the Longitude by means of the Moon's Distance from the Sun, or a Star, the most tedious and difficult part of the calculation, is to clear the Apparent Distance from the effects of Parallax and Refraction; the mode of performing this part of the operation, given in the present work, is extremely simple, and is perhaps the most convenient method of calculation that has ever been offered to the Public: It may be performed in *a third part* of the time that is required for the common methods.

The computation of the Apparent Time from the Altitude of the Sun, or a Star, is necessary, whether the Longitude be deduced from Lunar Observations, or Chronometers; this calculation is rendered very easy, and may be performed in about half the time required, when the common Tables are used.

A variety of Examples are given, to illustrate the use of the Tables; with occasional remarks on the nature of the Corrections, the mode of making the necessary observations, and the management of Time-keepers. These remarks, it is presumed, will be found useful to the young navigator, and to others who have not had much experience in the modes of finding the Longitude by Lunars and Chronometers.

Great attention has been paid to the correctness of the Tables, which are carefully arranged in the most convenient order, for performing the operations for which they are chiefly intended.

In the *Appendix* will be found, plain directions for acquiring a knowledge of the principal Fixed Stars, and examples of ascertaining the Latitude at Sea by them; with several useful Tables.

The author cannot avoid taking this opportunity of strongly recommending this part of the work, to the attention of all Navigators who are not much acquainted with this highly useful part of their profession; as there can be no doubt, that many accidents which happen at sea, might be prevented, were the practice of ascertaining the place of a ship, by means of the Fixed Stars, to become general amongst Seamen.

The author having used his best endeavours, throughout the work, to render it worthy the attention of Practical Navigators, most respectfully solicits a candid examination of its merits, in comparison with other works of a similar nature; and shall feel much gratified if his labours are found to contribute, in any degree, towards the improvement of an Art, on which the prosperity of this commercial country so greatly depends.

London, 16*th October*, 1824.

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INTRODUCTION.

TO prevent ambiguity in working the Examples, given to illustrate the use of the Tables, the reader is requested to attend to the following Remarks:

1. By the *apparent time* at Greenwich is always meant *the apparent* astronomical time at that meridian, and by mean time at Greenwich the mean astronomical time is to be understood.

2. When the estimated civil or nautical time is given at any meridian, it is first reduced to the estimated astronomical time at the given place, to which the longitude of that place in time being applied by *addition* or *subtraction*, according as the longitude is *west* or *east*, the estimated astronomical time at Greenwich is obtained; and to this time all the articles required from the Nautical Almanac are always reduced.

3. As the *civil time* is 12 hours in advance of the *astronomical time*, that is, the astronomical day commences at the noon of the civil day, of the same date, it is plain that when the given civil time is in the afternoon, or P. M. it answers to the astronomical time of the same date; but when the given civil time is before noon, (or A. M.) we must add 12 hours to it, the sum will be the *astronomical time* for the day of the month preceding the given civil day. For example, 5h. 30m. P. M. civil time, on the 10th of May, is 5h. 30m. astronomical time of the same date. But 5h. 30m. A. M. civil time, on the 10th of May, is 17h. 30m. *astronomical time*, on the 9th of May; for the 9th day of the month, according to astronomical time, commences at the noon of the 9th civil day, and ends at the noon of the 10th civil day, (the hours being reckoned up to 24;) and 5h. 30m. A. M. of the 10th, is 17h. 30m. from noon on the 9th.

4. The *astronomical day* begins at the instant that the *nautical day* (of the same date) ends, consequently nautical time is *always* 24 hours in advance of astronomical time, therefore to turn nautical time into astronomical time, we have only to reckon the hours from the preceding noon, and then change the date to the preceding day. Thus, 5h. 30m. P. M. nautical time, on May the 10th, is 5h. 30m. astronomical time, on May the 9th; and 5h. 30m. A. M. nautical time,

on May the 10th, is 17h. 30m. astronomical time on May the 9th, and so on.

5. The noon of the astronomical day is at the instant that it begins, and the noon of the nautical day is at the instant when it ends; and as both these take place at the noon of a civil day, of the same date, it is plain that the same noon answers for any given day in either of the three methods of reckoning time.

6. The *observed altitude*, or the *observed distance*, is the angle given by the instrument used in taking the observation, allowing for the index error, if any. Thus, if the distance measured by a sextant, which has an index error of 2′ 40″ additive, be 84° 21′ 50″, the observed distance will be 84° 21′ 50 + 2′ 40″, or 84° 24′ 30″. But if the index error of the sextant were 2′ 40″ subtractive, and the same angle measured by it, then the observed distance would be 84° 21′ 50″— 2′ 40″, or 84° 19′ 10″.

7. The *apparent altitude* of an object is found by applying its semidiameter, and the dip of the horizon,* to its observed altitude. The dip is always subtractive. The semidiameter is to be added or subtracted, according as the lower or upper limb of the object has been observed

8. The *true altituae* of the Sun, or a Star, is found by subtracting the correction in altitude† from the *apparent altitude.* In correcting a Lunar distance, by the method given in this work, the *apparent altitudes* only are used. In finding the time, the *true altitude* of the object is always used.

9. The *polar distance* of an object is its distance from the elevated Pole of the observer. Hence, when the latitude of the place of observation, and the declination of the observed object, are both of the same name, (that is, both North or both South) the difference between 90° and the declination is the *polar distance;* but when the latitude of the place, and the declination of the object are of contrary names, the sum of 90° and the declination of the object is its *polar distance.*

10. The *apparent distance* between any two objects means the apparent distance of their centres, and is found by applying the semidiameters of those objects to the observed distance, by addition, or subtraction, according as the nearest or farthest limbs have been observed.

11. The semidiameter of the Sun is found in page III. of the month in the Nautical Almanac, that of the Moon, in page VII. for every 12 hours; namely, for Noon and Midnight, at Greenwich, when the Moon's semidiameter is required for any intermediate time, a proportional part of the difference or variation in 12 hours is to be applied to the semidiameter for Noon or Midnight: this gives the horizontal semidiameter, which is to be farther corrected by the aug-

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* The Dip or Depression of the Horizon is contained in Table II.

† Table VI. contains the correction of the apparent altitude of the Sun or a Star.

mentation from Table IV. (see the explanation of that Table.) The fixed stars having no sensible magnitudes, as seen from the Earth, are esteemed as mere lucid points; hence, no allowance is to be made for semidiameter in observations of the fixed Stars.

PROBLEM I.

Given the Latitude of a Place, together with the Sun's true Altitude and Declination to find the Apparent Time of Observation.

RULE.

1. Add together the Sun's Altitude, the Polar Distance, and the Latitude of the place of observation; find the Half Sum, and the Difference between the Half Sum and the Sun's altitude.

2. To the logarithm of the Polar Distance, add the logarithm of the Latitude and the logarithms of the Half Sum and Difference, the sum of these 4 logarithms will be the logarithm of the Apparent Time.*

EXAMPLE I.

Suppose the Sun's true altitude, west of the meridian, is 34° 0′, his declination 10° 0′ N. and the Latitude of the place of observation 42° 0′ N. required the Apparent Time of observation?

Sun's true Altitude - - -	34°	0′		
Sun's Polar Distance - -	80	0	Log.	0,00665
Latitude - - - - - - -	42	0	Log.	0,12893
Sum - - - - - - - -	156	0		
Half Sum - - - - - - -	78	0	Log.	4,31788
Difference - - - - - -	44	0	Log.	4,84177
Apparent time, P.M. 3h. 31m. 0s.			Log.	9,29523

EXAMPLE II.

In Latitude 33° 56′ S. the Sun's true altitude, observed east of the meridian, was 24° 58′, and his declination at the same time was 2° 44′ N. required the Apparent Time of observation?

Sun's true Altitude - -	24°	58′		
Sun's Polar Distance - -	92	44	Log.	0,00049
Latitude - - - - - - -	33	56	Log.	0,08109
Sum - - - - - - - -	151	38		
Half Sum - - - - - -	75	49	Log.	4,08921
Difference - - - - - -	50	51	Log.	4,88958
Apparent time - - 20h. 11m. 8 s.			Log.	9,36037

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* Table XI. contains the Logarithms of the Polar Distance, and Latitude; Table XII. the Logarithms of the Half Sum and Difference; and Table XIII. the Logarithms of the Apparent Time.

If civil, or nautical time be required, when the Sun is observed east of the meridian, reject 12 hours from the astronomical time. Thus, the civil or nautical time in the last Example, would be 8h. 11m 8s. A. M. observing that when the date of the astronomical day is given, the date of the civil or nautical day will be one day farther advanced. In the practice of the Lunar Observations, the apparent astronomical time at the place of observation is always to be found.

PROBLEM II.

Given the true Altitude of a fixed Star, together with its Right Ascension and Declination, the Latitude of the place of observation, and the Sun's Right Ascension, to find the Apparent Time when the altitude is observed.

RULE.

1. With the Latitude of the place, the Star's true altitude and declination, find the Star's horary distance *west* of the Meridian, in the same manner as the Sun's horary angle is found by Problem I.

2. To the complement, to 24 hours, of the Sun's Right Ascension, add the Right Ascension of the Star, and its horary distance *west* of the Meridian; the sum, rejecting 24 or 48 hours, if necessary, will be the Apparent Time of observation.

EXAMPLE I.

In Latitude 33° 51 N. the true altitude of Regulus, observed west of the meridian, was 39° 21′; the Star's declination was 12° 50′ N.; its right ascension 9h. 58m. 51s.; and the right ascension of the Sun 3h. 22m. 8s.: required the apparent time of observation?

				*'s True alt.	39°	21'	
				*'s Polar dist.	77	10	Log. 0,01099
	h.	m.	s.	Latitude -	33	51	Log. 0,08066
	24	0	0				
Sun's R. A. - - - - - -	3	22	8	Sum -	150	22	
				Half sum	75	11	Log. 4,40778
Comp. of ☉'s R. A. - -	20	37	52	Difference	35	50	Log. 4,76747
*'s R. A. - - - - -	+ 9	58	51				
*'s Dist. W. of merid.	+ 3	23	44	- - - - - - - -			Log. 9,26690
Sum.—24=App. time -	10	0	27				

EXAMPLE II.

In Latitude 23° 31′ S. the true altitude of Rigel, observed east of the meridian, was 28° 42′; the declination of the Star being 8° 25′ S.; and its right ascension 5h. 5m. 55s. when the Sun's right ascension was 12h. 49m. 31s.: required the apparent time when the altitude was observed?

	h.	m.	s.
	24	0	0
Sun's R. A. - - - -	—12	49	31
Comp. of ☉'s R. A. -	11	10	29
*'s R. A. - - - - -	+ 5	5	55
*'s Dist. W. of merid.	+19	50	51
Sum—24=App. time -	12	7	15

*'s True alt.	28°	42′		
*'s Polar dist.	81	35	Log.	0,00470
Latitude -	23	31	Log.	0 03766
Sum - -	133	48		
Half sum	66	54	Log.	4,59366
Difference	38	12	Log.	4,79128
- - - - - - -			Log.	9,42730

REMARKS.

1. The method here given of deducing the apparent time from the meridian distance of a Star is somewhat different from that usually given, but the result is the same in both methods. The following is the *Rule* generally given.

When the Star is observed *east* of the meridian, *subtract* its horary distance from the meridian from its right ascension, increased by 24 hours, if necessary; the remainder will be the right ascension of the meridian. When the observation is made *west* of the meridian, *add* the right ascension of the Star to its meridian distance, the sum will be the right ascension of the meridian.

From the right ascension of the meridian, increased by 24 hours, if necessary, subtract the Sun's right ascension; the remainder will be the apparent time of observation. The two foregoing examples would stand as follows:

		h.	m.	s.
1. Regulus, west of the meridian - - - - - - -		3	23	44
Right ascension of Regulus - - - - - - - -		9	58	51
Right ascension of the meridian - - - -	(Sum	13	22	35
Sun's right ascension - - - - - - -	Subtract	3	22	8
Apparent time, as before - - - - - - - - - -		10	00	27
2. Right ascension of Rigel - - - - - - - - - -		5	5	55
Horary distance of Rigel, *east* of the meridian.	Sub.	4	9	9
Right ascension of the meridian + 24 hours - -		24	56	46
Sun's right ascension - - - - - - - - - - -		12	49	31
Apparent time, as before - - - - - - - - -		12	7	15

II. When a Star is observed *west* of the meridian, it is plain that its horary angle, reckoned west of the meridian, is *less* than 12 hours: But if a Star be observed *east* of the meridian, its horary angle, reckoning westward of the meridian, must be *greater* than 12 hours, for in this case it is the complement to 24 hours of the Stars horary distance east of the meridian; therefore, when the Star is observed *west* of the meridian, the hours of the horary angle will be found at the top of Table (XIII.); but when the Star is observed *east* of meridian, the hours of the horary angle must be taken from the bottom of that Table, exactly in the same manner as the Sun's horary angle is found.

III. The right ascensions and declinations of 61 of the principal fixed Stars, for the beginning of the year 1824, will be found in Table I. of the Appendix. The right ascensions and declinations given in this Table may be adapted to any other time, (within a few years of 1824,) by means of the annual variations; but when the Star observed, is one of the 24 Stars, of which the true apparent places are given in the Nautical Almanac, for every 10th day of the year, it will be easier and more accurate, to take the right ascension and declination from the Table there given.

IV. The Sun's right ascension is found in page II. of the month in the Nautical Almanac, for the noon of every day: the method of reducing it to any intermediate time by the rule of proportion is obvious; this reduction may, however, be made more easily by means of Table X. See the explanation of that table.

V. With the true altitude, the right ascension and declination of the Moon or any other Planet, the time may be found, the same as by a fixed Star.

PROBLEM III.

Given the Apparent Distance of the Moon from the Sun, or a Star, together with the Apparent Altitudes of the Objects, and the Moon's Horizontal Parallax: to find the True Distance.

RULE.

1. To the Logarithm of the Moon's horizontal parallax, add the Log. of the apparent altitude of the Sun, or Star, and the Log. S. of the apparent distance, the Sum will be the Logarithm of the *first correction.*

2. To the Logarithm of the Moon's horizontal parallax, add the Log. of the Moon's apparent altitude, and the Log. T. of the apparent distance, the sum will be the Logarithm of the *second correction.*[*]

3. Take the *third correction* from Table XVIII. corresponding to the given apparent distance and altitudes.

4. Add these three corrections to the apparent distance, the sum rejecting 10 degrees, will be the true distance.

EXAMPLE I.

Let the apparent distance between the Moon and a fixed Star be 72° 0′ 0″; the apparent altitude of the Star 32° 0′; that of the Moon 26° 0′, when the Moon's horizontal parallax is 59′ 0″: required the true distance?

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[*] The Logarithms of the Moon's hor. par. are contained in Table XIV.; those of the apparent altitudes in Table XV.; the Log. S. and Log. T. in Table XVI.; and the Logarithms of the first and second corrections in Table XVII.

Moon's hor. par.	0°	59′	0″	Log.	0,0244	- - - - -	Log.	0,0240
Star's app. alt.	32	0	0	Log.	0,7358	☽'s App. alt. 26° 0′	Log.	0,8182
App. distance	- 72	0	0	Log.S.	0,9782	- - - - .	Log.T.	1,4882
First correct.	+ 4	27	6	Log.	1,7384			
Second correct.	+ 5	8	25		- - - - - - - - -		Log.	2,3304
Third correct.	+	1	33					
Sum—10°=True dis.	71	37	4					

EXAMPLE II.

Suppose the apparent distance between the Sun and Moon to be 86° 19′ 10″, the Sun's apparent altitude 26° 3′, that of the Moon 66° 38′, and her horizontal parallax 55′ 47″: required the true distance?

Moon's hor. par.	0°	55′	47″	Log.	0,0488	- - - - .	Log	0,0488
Sun's app. alt.	26	3	—	Log.	0,8174	☽'s Ap. alt. 66° 38′	Log.	0,4972
App. distance -	86	19	10	Log.S.	0,9991	- - - - -	Log.T.	2,1913
First correct.	+ 4	35	27	Log.	1,8653			
Second correct.	+ 5	3	18		- - - - - - - - -		Log.	2,7373
Third correct.	+	2	10					
Sum—10°=True dis.	86	0	5					

If the distance in this Example were between the Moon and a Star, the third correction would be 2′ 18″; but the distance being between the Sun and Moon, the effect of the Sun's parallax on the distance is to be applied; now this is found in Table P. to be 8″ subtractive, the third correction is therefore 2′ 10″.

EXAMPLE III.

Let the apparent distance between the Moon and a Star be 96° 36′ 31″; the apparent altitude of the Moon 32° 12′; the Star's apparent altitude 47° 32′; and the Moon's horizontal parallax 54′ 0″: required the true distance?

Moon's hor. par.	0°	54′	0″	Log.	0,0629	- - - - -	Log.	0,0629
Star's app. alt.	47	32	0	Log.	0,5921	☽'s ap. alt. 32° 12′	Log.	0,7334
App. distance	96	36	31	Log.S.	0,9971	- - - - -	Log.T.	1,9355
First correct.	+ 4	19	54	Log.	1,6521			
Second correct.	+ 4	56	40		- - - - - - - - -		Log.	2,7318
Third correct.	+	2	14					
Sum—10°=True dis.	95	55	19					

EXAMPLE IV.

The apparent distance between the Sun and Moon being 41° 16′ 25″; the Sun's apparent altitude 46° 27′; that of the Moon 21° 9′; and the Moon's horizontal parallax 60◦ 35′: required the true distance?

Moon's hor. par.	0°60′35	Log.	0,0129		Log.	0,0129
Sun's app. alt.	46 27 —	Log.	0,5998	☽'s Ap. alt. 21° 9′	Log.	0,9027
App. distance -	41 16 25	Log.S.	0,8193	- - - - -	Log.T.	0,9432
First correct.	+ 3 53 26	Log.	1,4320			
Second correct.	+ 5 24 55	- - - - - - - - - -			Log.	1,8588
Third correct.	+ 1 41					
Sum—10°=True dis	40 36 27					

The following collection of Examples will be useful as Exercises in finding the True Distance.

Exam.	☽'s Hor. Par.		App. alt. of ⊙ or *.			☽'s App. alt.		Apparent Dist.			True Distance.		
1	56′	21″	⊙	20°	44′	23°	58′	59°	58′	54″	59°	50′	24″
2	58	45	*	27	43	48	22	81	23	38	81	4	32
3	56	32	⊙	25	16	19	19	72	21	40	72	3	50
4	61	10	*	11	51	44	33	64	36	40	64	46	14
5	59	21	⊙	72	22	31	8	75	28	43	74	40	43
6	59	21	⊙	54	12	48	40	76	0	33	75	23	27
7	56	56	⊙	31	34	14	53	101	33	29	101	2	49
8	55	22	*	48	18	22	43	77	44	4	77	8	25
9	60	39	*	42	54	26	3	55	2	48	54	32	26
10	54	20	*	49	31	34	27	92	10	41	91	30	14
11	56	13	⊙	66	50	21	30	57	16	19	56	30	15
12	58	35	⊙	19	4	41	6	103	29	27	103	3	18
13	56	15	*	24	48	12	30	51	28	(3)35	51	9	50
14	57	20	*	17	56	35	4	35	48	11	36	5	21
15	54	59	⊙	33	24	50	59	64	4	47	63	53	13
16	55	53	*	19	50	61	52	42	21	16	42	49	17

The mark ⊙ signifies that the distance is between the Sun and Moon, and the mark * that the distance is between the Moon and a Star.

PROBLEM IV.

To find the Apparent time at Greenwich, answering to a given True Distance between the Moon and Sun, or one of the Stars used in the Nautical Almanac.

RULE.

1. In one of the pages VIII. IX. X. or XI. of the month in the Nautical Almanac, opposite to the given day, or to that which immediately precedes or follows it, find two distances of the Moon from the given Object, one of which is *greater* and the other *less* than the given true distance.

2. Call the difference between the given true distance and the first distance, taken from the Nautical Almanac, the *first difference*, and

let the difference of the two distances taken from the Almanac be called the *second difference.*

3. From the Proportional Logarithm of the *first difference*, subtract the Proportional Logarithm of the *second difference*, the remainder will be the Proportional Logarithm of a part of Time; to which the Time over the first distance being added, the sum will be the Apparent Time at Greenwich, answering to the given true distance.

EXAMPLE.

August 10, 1823, the true distance between the Sun and Moon was found to be 55° 43′ 28″: required the apparent time at Greenwich, answering to that distance?

True distance - -	55° 43 28″			
Dist. in N. A. at III.	54 29 58	First diff. -	1° 13′ 30″	P. Log. 3890
Dist. in N. A. at VI.	56 4 0	Second diff.	1 34 2	P. Log. 2820
Proportional part of 3 hours -	2h. 20m. 42s. - -			P. Log. 1070
Time over the first distance +	3			
Apparent time at Greenwich -	5 20 42			

As the description of the Sextant, &c. with instructions for taking the Observations necessary in finding the Longitude by the Lunar method, may be found in all the modern works on Navigation, it has been judged unnecessary to enter fully into that subject here. A person can become an expert and correct observer by practice only; therefore those who have not been accustomed to observe Lunar Distances, should not be discouraged, although their first attempts may not answer their expectations. By a steady perseverance, with a due attention to the directions in the *Epitomes* of Navigation, it will be found that the Lunar Distances may, in ordinary cases, be as easily observed as common altitudes, and so correctly that the Longitude deduced from a set will seldom differ 10 miles from the truth. Perhaps some of the following hints may be of service to those, who have had only written instructions, to assist them in acquiring expertness in the practice of observing the Lunar Distances.

1. When the ship is pitching hard, the observer should place himself as near the midships as possible, provided the objects can be seen in that situation, the motion there being much less violent than it is near the head or stern; if the vessel be sailing nearly before the wind, and rolling very much, it will be useful to brace forward the yards and alter the course a little, during the time of taking the observations. The Sextant should be held as slack in the hand as is consistent with its safety; most observers at first grasp it too hard, which renders the hand very unsteady.

2. When observing with the *direct* telescope, great care must be taken that the line of sight be parallel with the plane of the instrument, otherwise the observed distance will be too great; the middle of the telescope should be set opposite to the middle of the transparent part of the horizon glass, and the observation made when the objects appear in this situation; for if the objects be observed too near either

the inner, or outer side of the transparent part of the horizon glass, the observed distance will exceed the truth, therefore the least distance is always to be observed.

3. When the *inverting* telescope is used, the observation is to be made when the objects appear in contact in the middle of the space between the wires, these being placed parallel to the plane of the Sextant. This telescope is in general to be preferred to the direct one, on account of its greater magnifying power; but an observer should accustom himself to the use of both, because when the motion of a ship is very great, the distance may be more easily observed with the direct telescope than with the inverting one. It appears rather difficult to most people at first to observe with the inverting telescope, but practice soon renders its use, in ordinary cases, as easy as the other. When observing with this telescope, should the objects get out of the field of view, the telescope must not be moved in the direction in which the objects appear to move but in the contrary one: for instance, suppose the Sextant is held in a vertical position, when the objects appear to go out of the field of view at the upper part of the telescope, they actually go out at the lower part, therefore the object end of the telescope must be moved downwards to bring the objects again into the field of view.

4. The best way to acquire confidence in the Longitude, deduced from the Lunar Distances, is to make a practice of finding the Longitude by the Lunar method; when near any place, the Longitude of which is well ascertained: then if the observation give the Longitude *east* of the true Longitude, the *observed distance* has been *too great*, or *too small*, according as the distance between the Moon and the other Object is *decreasing* or *increasing:* but if the observation give the Longitude *west* of the truth, the contrary is the case, that is, the observed distance must have been *too great* or *too small*, according as the Moon's distance from the other Object is *increasing* or *decreasing;* and the error in the observed distance, in any case, will be about two seconds, for every minute of error in the Longitude.

The following is the usual method of writing down a set of Lunar Distances, with the Altitudes of the objects observed at the same time, and of finding the mean observed distance and altitudes.

	Times per watch.	Dist. ☉ and ☽	Alts. ☉'s l. limb.	Alts. ☽'s up. limb.
	3h. 0m. 16s.	91° 19′ 10″	37° 58′	49° 58′
	1 25	19 40	37 43	50 15
	3 10	20 20	37 20	50 38
Divide by 3	4 51	59 10	121	51 sums
Means - -	3 1 37	91 19 43	37 $40\frac{1}{3}$	50 17
Index errors	- - - - -	+ 2 50	— 2	0
Observed distance and alts.		91 22 33	37 $38\frac{1}{3}$	50 17

If the Sun or Star be at a sufficient distance from the meridian, for the purpose of finding the time with correctness, when the distance is observed, it is not absolutely necessary to take the time of each observation by a watch, because the apparent time of observation may be deduced from the altitude of the Sun or Star, observed at the same time as the distance, however, it is generally proper to use a watch as a check on the observations; and if the differences of the respective observations are not nearly in proportion to the several intervals of time, these observations should be rejected, and a fresh set taken.

PROBLEM V.

The Latitude of a Place, and its Longitude by Account, being given, together with the observed Distance between the Moon and the Sun, or one of the Stars used in the Nautical Almanac, the observed Altitudes of the objects, and the estimated time of observation, to find the correct Longitude of the Place of Observation.

RULE.

1. To the estimated astronomical time at the Ship, apply the Longitude in Time, by *addition* or *subtraction*, according as the Longitude by account is *west* or *east;* this will give the estimated time at Greenwich, to which reduce the necessary articles from the Nautical Almanac.

2. From the observed distance and altitudes, deduce the apparent distance and altitudes, and also the true altitude of the Sun or Star, if the apparent time is to be inferred therefrom.

3. If the Sun or Star be at a proper distance from the meridian at the time the distance is observed, find the apparent time from the altitude observed at the time of taking the distance, by Problem I. or II., but if the Sun or Star be near the meridian at the time of observing the distance, find the error of the watch by means of altitudes taken before or after the observation of the distance.

4. From the apparent distance, and the apparent altitudes of the objects, together with the Moon's horizontal parallax, (from page VII. of the month in the N. A.) find the true distance, by Problem III

5. Having the true distance, find the apparent time at Greenwich, corresponding to that distance, by Problem IV.

6. The difference between the apparent time at the Ship, and the apparent time at Greenwich, is the Longitude in Time, and the Longitude will be *east* or *west*, according as the time at the Ship is *greater* or *less* than the time at Greenwich.

EXAMPLE I.

August 14th, 1823, about 3h. 0m. P. M. nautical time, in Latitude 11° 25′ S. and Longitude, by account, 32° 30′ W.; the observed distance between the Sun and Moon was 91° 22′ 33″; the observed altitude of the Sun's lower limb was 37° 38′; that of the Moon's upper limb 50° 19′, and the height of the eye 14 feet: required the Longitude of the Ship.

	h. m.			
Estim. astron. time at Ship, 13 Aug.	3 0		Moon's hor. par. at noon	55′ 31″
Longitude in time, W.	+ 2 10		Correction for 5h. 10m.	— 8
Estimated time at Greenwich	5 10		Reduced hor. par.	55 23
Observed distance of ☉ and ☽	91°22′ 33″		Moon's semid. at noon	15′ 7″
Sun's semidiameter	+ 15 49		Correction for 5h. 10m.	— 2
Moon's semidiameter	+ 15 17		Augmentation	+ 12
Apparent Distance	91 53 39		Moon's true semid.	15 17
Observed alt. ☉'s lower limb	37° 38′		Observed alt. ☽'s upper limb	50° 19′
Sun's semid. — dip of hor.	+ 12		Moon's semid. + dip of hor.	— 19
Sun's apparent altitude	37 50		Moon's app. alt.	50 0
Sun's correction in alt.	— 1			
Sun's true altitude	37 49		☉'s Decl. at noon	14° 52′ 5″
Sun's Polar distance	104 48	Log. 0.01465	Corr. for 5h. 10m.	— 3 56
Latitude	11 25	Log. 0.00868	☉'s Corr. declin.	+ 14 48 9
				90
Sum	154 2			
Half Sum	77 1	Log. 4.35154	☉'s Polar dist.	104 48 9
Difference	39 12	Log. 4.80074		
App. time at Ship	3h. 2m. 11s.	Log. 9,17561		

Moon's hor. par.	0° 55′ 23″	Log. 0.0519		Log. 0.0519
Sun's app. alt.	37 50 —	Log. 0.6723	☽'s App. alt. 50° 0′	Log. 0.5757
Apparent distance	91 53 39	Log. S. 0.9998		Log. T. 2.4792
First correction	+ 4 26 1	Log. 1.7240		
Second correction	+ 4 58 36			Log. 3.1068
Third correction	+ 1 55			
Sum—10° = True dis.	91 20 11			

Dist. in N.A. at 3h.	90 18 50	First diff	1° 1′ 21″.	P. Log. 4675
Dist. in N.A. at 6h.	91 44 10	Second diff.	1 25 20	P. Log. 3242
			h. m. s.	
Proportional part of 3 hours			2 9 24	P. Log. 1433
Time over first distance in N. A.			3 — —	
Apparent time at Greenwich			5 9 24	
Apparent time at Ship			3 2 11	
Longitude in time			2 7 13 = 31° 48′ 15″ W.	

EXAMPLE II.

December 25, 1823, at 9h. 30m. A. M. nautical time, in Latitude 29° 0′ S. and Longitude, by account, 37° 30′ E.; the observed distance between the Sun and Moon was 81° 1′ 30″; the observed altitude of the Sun's lower limb was 55° 58′; that of the Moon's upper limb 41° 54′, and the height of the eye 13 feet: required the true Longitude of the Ship.

	h. m.		
Estim. astron. time at Ship 24th	21 30	Moon's hor. par. at midnight	57′ 40″
Longitude in time, E. -	2 30	Correction for 7h. 0m. - - -	— 13
Estimated time at Greenwich	19 0	Moon's correct hor. par. - -	57 27

Observed dist. of ☉ and ☽	81° 1′ 30″	Moon's semid. at midnight -	15′ 43″
Sun's semidiameter - -	+ 16 18	Correction for 7h. 0m. - -	— 3
Moon's semidiameter -	+ 15 51	Augmentation - - - - -	+ 11
Apparent distance - -	81 33 39	Moon's true semidiameter -	15 51

Obs. alt. of ☉'s low. limb -	55° 58′	Observed alt. of ☽'s up. limb	41° 54′
Sun's semid. — dip - - -	+ 13	Moon's semid. + dip - -	— 19
Sun's apparent altitude -	56 11	Moon's apparent altitude -	41 35
Sun's correction in alt. -	— 1		

Sun's true altitude - - -	56 10		☉'s Decl. at noon	23° 27′
Sun's polar distance - -	66 34	Log. 0.03738	Cor. for 19h. 0m.	— 1
Latitude - - - - - - -	29 0	Log. 0.05818	Reduced declin.	23 26
				90
Sum - - - - - - -	151 44			
Half Sum - - - - -	75 52	Log. 4.38771	Polar distance -	66 34
Difference - - - - -	19 42	Log. 4.52775		
App. time at Ship. 21h. 30m. 34s.		Log. 9.01102		

Moon's hor. par.	0° 57′ 27″	Log. 0.0360	- - - - -	Log. 0.0360
Sun's app. alt.	56 11 —	Log. 0.5405	☽'s ap. alt. 41° 35′	Log. 0.6380
App. distance	81 33 39	Log. S. 0.9953	- - - - -	Log. T. 1,8290
First correct.	+ 4 11 45	Log. 1.5718		
Second correct.	+ 5 5 39	- - - - -	- - - - -	Log. 2.5030
Third correct.	+ 1 37			

Sum — 10° = True dis.	80 52 40			
Dis. in N.A. at 18h.	81 21 48	First diff. -	0° 29′ 8″	P. Log. 7909
Dis. in N.A. at 21h.	79 49 44	Second diff	1 32 4	P. Log. 2912
			h. m. s.	
Apparent time at Greenwich, (add 18h.) -			18 56 58	P. Log. 4997
Apparent time at Ship - - - - - - -			21 30 34	
Longitude in time - - - - - - - - -			2 33 36 = 38° 24′ 0″ E.	

REMARK.

In the last Example, and also in those that follow, the time over the first distance, taken from the Nautical Almanac, is added to the proportional part of 3 hours without being placed under it.

EXAMPLE III.

March 14, 1824, about 10h. 52m. P. M. nautical time, in Latitude 34° 53′ N. and Longitude, by account, 32° 0′ W. the observed distance between *Pollux* and the Moon's nearest limb was 47° 10′ 10″; the observed altitude of the Star, *west* of the meridian, was 53° 4′, and that of the moon's lower limb 59° 43′ height of the eye 12 feet: required the true Longitude of the Ship?

	h. m.		
Estim. astron. time at Ship 13th March	10 52	Moon's hor. par. at midnight	60′ 44″
Longitude in time, W.	+ 2 8	Correction for 1h. 0m.	— 1
Estimated time at Greenwich	13 0	Corrected hor. par.	60 43

Observed dist. of ✻ from ☽'s nearest limb	47°10′ 10″	Moon's semid. at midnight	16′ 33″
☽'s Horizontal semidiam. + augmentation	+ 16 49	Correction for 1h. 0m.	0
Apparent distance	47 26 59	Corrected semidiameter	16 33

Star's observed altitude	53° 4′		Observed alt. ☽'s lower limb	59°43′
Dip	— 3		Semid. — dip	+ 13
Star's apparent altitude	53 1		Moon's apparnet altitude	59 56
Refraction in altitude	— 1			h. m. s.
Star's true altitude	53 0		Sun's R. A. at noon	23 33 56
Polar dist. of Pollux, from N. A.	61 33	Log. 0.05590	Correction for 13h. 0m.	+ 1 58
Latitude	34 53	Log. 0.08602		
			⊙'s R. A. at time of obs.	23 35 54
Sum	149 26			24
Half Sum	74 43	Log. 4.42093		
Difference	21 43	Log. 4.56822	Comp. of ⊙'s R. A.	0 24 6
	h. m. s.			
Pollux W. of the merid.	2 52 36	Log. 9.13107		
R. A. of Pollux, from N. A. +	7 34 35			
Comp. of ⊙'s R. A. +	0 24 6			
Sum = App. time at Ship	10 51 17			

Moon s hor. par.	0°60′ 43″	Log. 0.0120		Log. 0.0120
Star's app. alt.	53 1 —	Log. 0.5576	☽'s App. alt. 59° 56′	Log. 0.5228
Apparent distance	47 26 59	Log.S. 0.8673		Log. T. 1.0372
First correction +	3 54 11	Log 1.4369		
Second correction +	5 48 13			Log. 1.5720
Third correction +	55			
Sum — 10° = True dist.	47 10 18			
Dist. in N. A. at midnight	46 34 10	First diff. 0°36′ 8″	P. Log. 6974	
Distance in N. A. at 15h.	48 24 39	Sec. diff. 1 50 29	P. Log. 2120	
		h. m. s.		
Apparent time at Greenwich		12 58 52	P. Log. 4854	
Apparent time at Ship		10 51 17		
Longitude in time		2 7 35 = 31° 53′ 45″ W.		

EXAMPLE IV.

March 23, 1824, about 9h. 50m. A. M. nautical time, in Latitude 36° 7′ N. and Longitude 20° 0′ W. by account, the following observations were made; height of the eye 16 feet: required the true Longitude of the Ship?

	Obs. dis. ☉ & ☽'s nearest limbs.	Obs. alts. ☉'s lower limb.	Obs. alts. ☽'s upper limb.
	78°59′50″ 59 10 58 40	43°45′ 0″ 43 59 0 44 12 0	16°37′ 0″ 16 23 0 16 12 0
Sums div. by 3	27 40	11 56 0	72 0
Means - - -	78 59 13	43 58 40	16 24 0
Index errors -	+ 2 50	0 0	0 0
Semidiameters	+ 30 57	+ 16 4	— 14 53
Dip of horizon		— 3 49	— 3 49
Ap. dist. & alts.	79 33 00	44 10 55	16 5 18

	h. m.
Estim. astron. time at Ship 22d Mar.	21 50
Longitude in time, W. - - +	1 20
Estim. time at Greenwich 22d. -	23 10
Moon's semid. at noon 23d - -	14′ 49″
Correction for 0h. 50m. - - - -	0
Corrected semidiameter - - -	14 49
Augmentation - - - - - - -	4
Sun's semidiameter - - - - -	16 4
Sum of semidiameters - - - -	30 57

Sun's app. alt. - -	44°10′ 55″		
Correction in alt. -	— 53		
Sun's true alt. - -	44 10		
Sun's polar distance	88 53	Log.	0.00008
Latitude - - - - -	36 7	Log.	0.09269
Sum - - - - - -	169 10		
Half sum - - - -	84 35	Log.	3.97496
Difference - - -	40 25	Log.	4.81180
App. time at Ship 21h. 52m. 10s.		Log.	8.87953

Moon's hor. par. at noon, 23d -	54′ 22″
Corr. for 0h. 50m. - - - - - -	+ 1
☽'s Corrected hor. par. - - -	54 23
Sun's declin. at noon 23d. -	1° 7′ 30″ N.
Correction for 0h. 50m. -	48
Corrected declination - -	1 6 42 N.
	90
Sun's polar distance -	88 53 18

Moon's hor. par. -	0°54′ 23″	Log.	0.0598	- - - - - - - - - -	Log.	0.0598
Sun's app. alt. - -	44 11 —	Log.	0.6168	☽'s App. alt. 16° 5′ - -	Log.	1.0175
Apparent distance -	79 33 0	Log. S.	0.9927	- - - - - - - - - -	Log. T.	1.7342
First correction - +	4 21 27	Log.	1.6693			
Second correction +	5 2 47			- - - - - - - - - - - - - - - - -	Log.	2.8115
Third correction +	2 29					

Sum—10° = True dis.	78 59 43				
Dist. in N. A. at 21h.	80 0 44	First diff. - - -	1° 1′ 1″	P. Log.	4698
Dist. in N. A. at Noon	78 39 1	Second diff. - -	1 21 43	P. Log.	3430
			h. m. s.		
Apparent time at Greenwich - - - - - - - - -			23 14 25	P. Log.	1268
Apparent time at Ship - - - - - - - - - - -			21 52 10		

Longitude in time - - - - - - - - - - - - - 1 22 15 = 20° 33′ 45″ W.

Besides the opportunities afforded to the Navigator of determining his Longitude by the Distances of the Moon from the Sun and the Stars, which are given in the Nautical Almanac, he may now find the Longitude, with equal ease and certainty, from observations of the Moon with Venus, Mars, Jupiter, or Saturn. The distances of the Moon from these Planets, with the other necessary *data*, being given in *Schumacher's* Ephemeris. This very useful work is printed at Copenhagen; but the distances, &c. are calculated for the meridian of Greenwich, and the explanation is in English.

The mode of finding the Longitude by this method, is nearly the same as that employed in finding the Longitude from a distance between the Moon and a fixed Star. If the distance between the centre of the Planet and the enlightened limb of the Moon be observed, no correction will be necessary for the Planet's semidiameter. The effect of the Parallax of Jupiter or Saturn may be neglected; it is however proper, in most cases, to apply a correction to the apparent distance between the Moon and Venus, or Mars, for the effect of the Parallax of these Planets. If the apparent distance between the Moon and a Planet exceed 34°, the effect of the Planet's parallax on the distance may be found by the small table P in Table XVIII., as follows:

Enter table P with the given distance and altitudes, using the altitude of the Planet for that of the Sun, and take out the corresponding correction; multiply this by the horizontal parallax of the Planet, and divide the product by 9, the quotient will be the effect of Planet's parallax on the distance, to be applied by addition or subtraction, according as the effect of the Sun's parallax would be applied, if the distance, &c. were of the Sun and Moon. For example,

Suppose the apparent distance between the Moon and Mars is 60°, the apparent altitude of the Moon 60°, and that of the Planet 40° when its horizontal parallax is 12″. 8, required the effect of the parallax of Mars on the distance. At apparent distance 60° in Table XVIII. in the small table P under the Sun's altitude 40°, and opposite to the Moon's 60°, is 6″ to be subtracted; now 6″ × 12″. 8 = 76. 8, which being divided by 9 gives 8″. 53, or $8\frac{1}{2}''$, to be subtracted from the apparent distance, or from the third correction, before it be applied to the apparent distance.

The horizontal parallax of each of the four Planets, before mentioned, is given in Schumacher's tables, and also the semidiameter of Venus; the semidiameters of the others may be easily found, as follows:

1. To find the semidiameter of Mars,—Multiply the horizontal parallax of the Planet by 3, and divide the product by 4, the quotient will be the semidiameter.
2. To find the semidiameter of Jupiter,—Multiply its horizontal parallax by 11, the product will be the semidiameter.
3. To find the semidiameter of Saturn,—Multiply its horizontal parallax by 10, the product will be the semidiameter.

These methods of finding the semidiameters are only approximations, but will be sufficiently exact for finding the semidiameter of a Planet, for the purpose of applying it to an observed Lunar Distance; however, if the distance between the Moon's limb and the centre of the Planet be observed, no correction for the semidiameter is required.

EXAMPLE.

March 14, 1824, about 10h. 30m. P. M. nautical time, in Latitude 34° 56′ N. and Longitude, by account, 32° W. the observed distance between the Moon's nearest limb and the centre of Jupiter was 65° 7′ 53″; the observed altitude of Jupiter, west of the meridian, was 37° 18′, and that of the Moon's lower limb 59° 26′; the height of the eye being 16 feet: required the true Longitude of the Ship?

	h. m.	
Estim. astron. time at Ship 13th March	10 30	
Long. by acc. 32° W. in time	+ 2 8	
Estimated time at Greenwich	12 38	
Ob. dis. of Jup. from ☽'s nearest limb	65° 7′ 53″	
Moon's horizontal Semid. + Aug. =	+ 16 49	
Apparent distance	65 24 42	
Obsd. alt. of Jupiter	37°18′	
Dip of hor.	— 4	
App. altitude	37 14	
Refraction	— 1	
True alt. of Jupiter	37 13	
Polar distance	66 27	Log. 0.03777
Latitude	34 56	Log. 0.08628
Sum	138 36	
Half Sum	69 18	Log. 4.54836
Difference	32 5	Log. 4.72522
	h. m. s.	
Jup. W. of merid.	3 59 54	Log. 9.39763
R. A. of Jupiter	6 6 42	
Comp. of ☉'s R. A.	0 24 8	
App. time at Ship	10 30 44	

Moon's hor. par. at midnight	60′ 44″
Correction for 0h. 38m.	0
Corrected hor. par.	60 44
Moon's semid. at midnight	16′ 33″
Correction for 0h. 38m.	0
Corrected semidiameter	16 33
Obs. alt. ☽'s lower limb	59°26′
Semidiameter — dip	+ 13
Moon's app. alt.	59 39
Decl. of Jup. at noon 13 March	23°32′43″
Correction for 12h. 38m.	+ 2
Corrected declination	23 32 45
	h. m. s.
R. A. of Jup. at noon 13th March	6 6 35
Correction for 12h. 38m.	+ 7
Corrected right ascension	6 6 42
	h. m. s.
Sun's R. A. at noon 13th March	23 33 56
Correction for 12h. 38m.	+ 1 56
Sun's corrected R. A.	23 35 52
	24
Complement of ☉'s R. A.	0 24 8

Moon's hor. par.	0° 60′ 44″	Log. 0.0118			Log.	0.0118
App. alt. of Jupiter	37 14 —	Log. 0.6782	☽'s App. alt. 59° 39′		Log.	0.5240
Apparent distance	65 24 42	Log. S. 0.9587			Log. T.	1.3396
First correction	+ 4 19 35	Log. 1.6487				
Second correction	+ 5 23 59				Log.	1.8754
Third correction	+ 1 24					
Sum — 10° = True dist.	65 9 40					
Dist. of ☽ & ♃ at m. n.	64 46 5	First diff.	0° 23′ 35″	P. Log. 8827		
Dist. of ☽ & ♃ at 15h.	66 37 41	Second diff.	1 51 36	P. Log. 2076		
			h. m. s.			
Apparent time at Greenwich			12 38 2	P. Log. 6751		
Apparent time at Ship			10 30 44			
Longitude in time			2 7 18	= 31° 49′ 30″ W.		

REMARK.

In finding the Longitude by a Planet and the Moon, the observations may often be made soon after sun set, or shortly before sun rise, when the twilight is so strong, and the horizon so well defined, as to admit of the altitudes of the objects being observed with great accuracy: the angles may also frequently be read off the instruments without the assistance of artificial light.

In the foregoing Examples it has been supposed that the altitudes of the objects were found by observation, it however sometimes happens in the night, that the distance between the Moon and a Star may be very correctly observed when the horizon is so obscure as to render the observed altitudes rather uncertain. Also in the practice of the Lunar Observation on shore, it is not always convenient to observe the altitude at the same time with the distance; in such cases it is necessary to find the Altitudes by calculation. For the computation of an altitude, it is necessary to have the following elements:

1. The Latitude of the place: and its Longitude by account.
2 The apparent time at that place when the altitude is required.
3. The declination of the object, and also its right ascension, together with that of the Sun, if the object, whose altitude is required, be the Moon or a Star.

In the following *Rule*, the right ascension and declination of the Sun or Moon are understood to be taken from the Nautical Almanac, and the right ascension and declination of a Star from Table I. of the *Appendix*, or from any other correct Catalogue. The places of all the Stars from which the Moon's distance is given in the Nautical Almanac, will be found in the Table containing the true apparent places of 24 of the principal fixed Stars, at the end of that work.

PROBLEM VI.

Given the Latitude of a place, and its Longitude by account, together with the Apparent Time, to find the True Altitude of a known Celestial Object.

RULE.

1. Find the horary distance of the object from the meridian. This, if the object be the Sun, is the interval between the given apparent time and noon; but if the object be the Moon or a Star, add the Sun's right ascension to the given apparent time, the sum rejecting 24 hours, if necessary, will be the right ascension of the meridian; the difference between this, and the right ascension of the given object, will be its horary distance from the meridian.

2. If the Latitude of the place, and the Declination of the given object, be both North, or both South, their *difference* will be the meridian Zenith distance of the object; but if one be North and the other South, their *sum* will be the meridian Zenith distance.

3. Add together the Logarithm of the horary angle of the object, Table XIII., the Logarithms of the Latitude and Declination used as Half Sums, in Table XII., and the Logarithm of the meridian Zenith distance, used as a Latitude, in Table XI.; the sum of these 4 Logarithms, rejecting 10 from the Index, will be the Logarithm of an arch in time, in Table XIII.

4. Turn the above found arch into degrees, &c. and using it as a Latitude, take out its Logarithm from Table XI., which add to the Logarithm of the meridian Zenith distance, (before found) the sum will be the Logarithm of a Polar Distance, in Table XI., which will be equal to the *True Altitude* of the given object.

EXAMPLE.

May 10th, 1824, by nautical time, at 10h. 39m. 25s. apparent time, P. M. in Latitude 37° 42′ N., and Longitude by account 67° 30′ W.: required the true altitude of *Antares*.

	h m. s.			
Astron. time at Ship, 9th May -	10 39 25			
Longitude in time, W. - -	+ 4 30 0			
Estimated time at Greenwich -	15 9 25			
	h. m. s.			
Sun's R. A at noon 9th May -	3 5 9			
Correction for 15h. 9m. - -	+ 2 28			
Sun's Reduced R. A. - - -	3 7 37			
Apparent time at Ship - - -	10 39 25			
Right ascension of meridian -	13 47 2			
Right ascension of *Antares* -	16 18 42			
Star's horary angle - - . . -	2 31 40	- - - - Log. (Tab. XIII.)	9.02345	
Star's declination - - - - -	26° 2′ S	As a ½ sum Log. (Tab. XII.)	4.95354	
Latitude - - - - - - - -	37 42 N	As a ½ sum Log. (Tab. XII.)	4.89830	
Star's merid. zenith distance -	63 44	As a Lat. Log. (Tab. XI.)	0 35404—	0,35404
	h. m. s.			
Arch in time - - - - - - -	3 14 32	- - - - Log. (Tab. XIII.)	9.22933	
Arch in Degrees - - - - - -	48°38′ —	As a Lat. Log. (Tab. XI.)	——	0.17988
True altitude - - - - - - -	17 0 —	As a Pol. dist. Log. (Tab. XI.)	——	0.53392

As the apparent altitudes are used in correcting a Lunar Distance, it is necessary to reduce the true altitudes, when found as above, to the apparent altitudes; this, when the object is the Sun or a Star, is done by taking the correction for the given altitude, from Table VI., and adding it to the true altitude, the Sum will be the apparent altitude. Thus the apparent altitude of a Star, when its true altitude is 17° 0′, would be 17° 3′ 5″, or the apparent altitude of the Sun, when the true altitude is 17° 0′, is 17° 2′ 56″. But when the true altitude of the Moon is to be reduced to the apparent altitude, it will be necessary to proceed as follows:

With the Moon s true altitude, used as a Latitude, take out a Logarithm from Table XI. to this Log.; add the Proportional Logarithm of the Moon's horizontal parallax, the sum will be the Proportional Logarithm of the Moon's parallax in altitude, from which subtract the refraction in altitude, (the star's correction in altitude, Table VI. is the refraction in altitude, of any object;) the remainder being subtracted from the true altitude will leave the apparent altitude.

EXAMPLE.

Suppose the Moon's true altitude is 35° 23′, when her horizontal parallax is 59′ 42″. What would be the apparent altitude of the Moon?

Moon's true altitude - - - - - -	35° 23′	As a Lat. Log. from Table XI. - -			0.0887
Correct. of Moon's alt. - - - - -	— 47	Moon's hor. par. -	59′ 42″	P. Log	0.4793
Moon's apparent altitude - - - -	34 36	Moon's par. in alt.	48 40	P. Log.	5680
		Moon's refr. in alt.	1 20		
		Corr. in alt. - - - -	47 20		

REMARKS.

I. If great accuracy were required, the operation of finding the Moon's correction in altitude ought to be repeated, using the Moon's apparent altitude, as found above, in place of the true altitude, and then subtracting the correction thus found from the true altitude; however, one operation is quite sufficient for the purpose of finding the Moon's apparent altitude, as required in the method of correcting the Lunar Distances, which is given in this work.

II. If an object be near the meridian, in bearing, or azimuth, when its altitude is to be computed, any probable error in the apparent time, will not cause a material error in the altitude; but any error in the Latitude will, in this case, cause nearly an equal error in the altitude.

III. If the object be near the prime vertical, that is near the east or west, at the time its altitude is to be found by calculation, any probable error in the Latitude of the place will cause very little error in the altitude; but an error in the apparent time will then greatly affect the altitude. In this case the error in the altitude arising from an error of 1 minute of time, will, in places near the Equator, be nearly 15 minutes of a degree; in high Latitudes the error is less.

IV. When the object is considerably distant, both from the meridian and prime vertical, its computed altitude is affected by an error either in the Latitude or apparent time; but the error of altitude, arising from an error in the Latitude, will not be so great as when the object is near the meridian, nor will the error, occasioned by an error in the apparent time be so great as when the object is near the prime vertical.

V. The apparent altitudes being found by computation, the true distance and time at Greenwich, are to be found in the same manner as before: but it very rarely happens at sea that the altitude of the Moon may not be observed with sufficient accuracy, for the purpose of clearing the distance of parallax and refraction, nor is it often necessary to calculate the altitude of a Star; however, as any given error in the altitude of the Star, will in general cause a greater error in the computed distance, than an equal error in the altitude of the Moon, it is proper, when the observed altitude of the Star is at all uncertain, to compute its altitude.

In cases where there is not a sufficient number of observers to take the distance, and the altitudes of the objects, at the same time, it is necessary to observe the altitudes both before and after the time of taking the distance, and then reduce them, by the Rule of Proportion, to what they would be at the time the distance is observed. This may be done in the following manner:

	Times. h. m. s.	Diff. m. s.	Obs. alt ☉'s l. l.	Diff.		Times. h. m. s.	Diff. m. s.	Obs. alt. ☽'s up. l.	Diff.
1st.	3 24 16		27° 14′		1st	3 24 58		31° 24′	
		7 34		1° 19′			8 23		0°.35′
2d.	3 31 50		25 53		2d.	3 33 21		31 59	

	Times. h. m. s.	Dists. ☉ and ☽'s nearest limbs.
	3 26 14	68° 34′ 50″
	27 49	35 40
	29 31	36 30
Sums	23 34	120
Means	3 27 51	68 35 40

Here the interval between the time of observing the first altitude of the Sun, and the mean of the times, when the distances were observed, is 3m. 35s.; and as the Sun's altitude decreases 1° 19′ in the space of 7m. 34s. the change in 3m. 35s. will be 0° 37′, which is to be subtracted from the first altitude, because the altitude is decreasing: hence the altitude of the Sun's lower limb, corresponding to the mean distance, is 26° 37′.

In the same manner the altitude of the Moon's upper limb, corresponding to the mean distance, is found to be 31° 36′, we have therefore the following set of observation:

Time per watch of obs.	Obs. dist ☉ & ☽'s nrst. limbs.	Obs. alt. ☉'s l. l	Obs. alt. ☽'s up. l.
3h. 27m. 51s.	68° 35′ 40″	26° 37	31° 36′

From these, the Longitude is to be deduced in the same manner as before. It will be proper, however, to find the error of the watch by means of a set of altitudes, taken before or after the altitudes, to be employed in correcting the distance. It seldom happens but the altitudes of at least one of the objects, may be observed at the same time as the distances, in this case; it is generally proper to observe the altitudes of the Sun or Star along with the distances, and then deduce the altitude of the Moon, as in the foregoing Example.

ON FINDING THE

Longitude by Chronometers.

This method of finding the Longitude depends on the same principle as the Lunar method, that is, on being able to find the respective *times* at two meridians, for the same instant of absolute time, when the difference of these times will give the difference of Longitude between the two meridians. For example,

Suppose a Chronometer that keeps mean time exactly, be set to mean time at Greenwich, and then taken to another meridian, where the mean time is found, by observation, to be 4 hours at the instant that the time by the Chronometer is only 2 hours; we know that the place of observation is 30° E. of Greenwich, because the time at that place is 2 hours farther advanced than the time at Greenwich: but if the time shewn by this Chronometer were 4 hours at the instant, the mean time found, by observation, is only 2 hours, then the Longitude of the place is 30° W. of Greenwich, because the time at Greenwich is 2 hours farther advanced, than the time at the place of observation.

A Chronometer generally deviates something from mean time in its rate of going; the portion of time which it gains or loses on mean time, during 24 hours, is called its Daily Rate, or simply the *Rate*, and what a Chronometer is fast or slow, for mean time at a given meridian, is called its *Error* for that meridian. Those who reckon the Longitude from the meridian of Greenwich, should always have the errors of their Chronometers for that meridian. If the *rate* of a Chronometer and its *error*, for any particular time be known, the *error* for any other time is found by multiplying the rate by the number of days between the times. Thus, let the rate of a Chronometer be 5s. 4 gaining, and it is found to be fast for mean time at Greenwich, at noon, on the 5th of June, 0h. 11m. 31s.; the error on the 2d of July, at noon, would be 0h. 13m. 57s.; for here the number of days elapsed is 27 and 5s. 4. × 27 = 145s. 8. or 2m. 26s., and 0h. 11m. 31s. + 2m. 26s. = 0h. 13m. 57s.

But it is better to set down the errors for the noon of each day at Greenwich. For example, Let there be two Chronometers, Nos. 185 and 230, No. 185 is *slow* for *mean noon* at Greenwich, on the 10th of June, 1824, 0h. 0m. 37s., and is *gaining* on mean time 9s. 6 in 24 hours.

On the same day, No. 230 is slow for *mean noon* at Greenwich, 0h. 28m. 46s. and is *losing* on mean time 3s. 5 daily ; the errors for the subsequent days may be set down, as follows :

Date.		Errors of No. 185.				Errors of No. 230.			
1824.	June	h.	m.	s.		h.	m.	s.	
Th.	10	0	0	37,0	—	0	28	46,0	—
Fr.	11		0	27,4	—[*]		28	49,5	—
Sa.	12		0	17,8	—		28	53,0	—
Sun.	13		0	8,2	—		28	56,5	—
M.	14		0	1,4	—		29	0,0	—
Tu.	15		0	11,0	+		29	3,5	—
W.	16		0	20,6	+		29	7,0	—
Th.	17		0	30,2	+		29	10,5	—
Fr.	18		0	39,8	+		29	14,0	—
Sa.	19		0	49,4	+		29	17,5	—
Sun.	20		0	59,0	+		29	21,0	—
&c.			&c.				&c.		

It is very convenient to have a Table of this kind attached to the Nautical Almanac. Or the *errors* of a time-keeper for the noon of each day, may be set down in the margin of page II. of the month in the Nautical Almanac, in this case the error for the given day may be taken out along with the equation of time. It is plain that when the error is wanted for any other time, than noon at Greenwich, a proportional part of the daily rate must be allowed.

PROBLEM VII.

Having a Chronometer, of which the error for Mean Time at Greenwich is known, and also the Latitude of a place, to find the Longitude of that place.

RULE.

1. When the Sun, or a known Star, is at a proper distance from the meridian, take a set of altitudes and note the corresponding times by the Chronometer ; to the mean of the times by the Chronometer, apply its error for mean time at Greenwich, by *addition* or *subtraction*, according as it is too *slow* or too *fast*, the sum or difference will be the Mean Time at Greenwich when the observation is made.
2. From the mean observed altitude, deduce the true altitude.

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[*] It is usual to distinguish the *errors* and *rates* of Time-keepers by the signs + and — the sign + being attached to the *error* to signify that it is *fast ;* or to the *rate* to denote that it is *gaining*. The sign — signifies the contrary.

3. With the Latitude of the place, the true altitude, and the declination of the object, find the Apparent time by Problem I. or II., according as the altitude of the Sun or a Star has been observed. To the Apparent Time, apply the equation of time, (from page II. of the month in the N. A.) which will give the Mean Time of observation at the Ship; the difference between this time and the Mean Time at Greenwich, is the Longitude of the Ship in time, and the Longitude will be *east* or *west*, according as the time at the Ship is *greater* or *less* than the time at Greenwich.

EXAMPLE I.

August 25, 1823, nautical time, in Latitude 27° 35′ S. the following altitudes of the Sun's lower limb were observed *east* of the meridian, together with the corresponding times by a Chronometer, that was at that time too fast for mean time at Greenwich 1m. 48s.; the index error of the instrument with which the altitudes were observed, was 3′ 10″ additive, and the height of the observer's eye 14 feet: required the Longitude of the Ship?

	Times per Chr.		Alt. ⊙'s l. limb.	⊙'s semidiameter -	15′ 52″
	h. m. s.			Dip - - - —3 36	-5 4
	10 25 32		31° 29′ 10″	Cor. in alt. - —1 28	
	26 13		35 50	Cor. of obsd. alt. - -	10 48
	27 24		47 0		
Divide by 3 - - -	69		22 0	The astron. time at Greenwich is 22h. 25m. Aug. 24.	
Means - - - -	10 26 23	- - - - - -	31 37 20	⊙'s Decln. 24th	11°19′ 10″ N.
Chr. fast, (sub.) -	1 48	Index error	+ 3 10	Cor. for 22h. 25th	— 19 10
M. T. at Greenwich	10 24 35	Observed alt.	31 40 30	Corr. declin. -	11 0 0
M. T. at Ship - -	9 2 23	Cor. of obs. alt.	+ 10 48		
Long. in Time - -	1 22 12	⊙'s true alt. -	31 51 18		
= Longitude - -	20°33′ W.	⊙'s polar dist.	101 0	Log.	0.00805
		Latitude - -	27 35	Log.	0.05240
		Sum - - -	160 26		
		Half Sum - -	80 13	Log.	4.23025
		Difference - -	48 22	Log.	4.87356
			h. m. s.		
		App. time - -	9 0 19	Log.	9.16426
		Eqn. of time	+ 2 4		
		M. T. at Ship	9 2 23		

The time at Greenwich, obtained by the Chronometer, is used in the foregoing Example, for the purpose of finding the correction of the Sun's declination; in strictness, this time should be reduced to the apparent Greenwich time, by applying to it the Equation of time, with a contrary sign to that in the Nautical Almanac. It is of very little consequence, however, whether the mean or the apparent time be used in finding the correction of the Sun's declination; but when the time is to be found from the altitude of a Star, the apparent time at Greenwich ought to be used in finding the correction of the Sun's right ascension.

In the foregoing example, and also in those that follow, the nearest minutes of the true altitude, and polar distance, are used in finding the time, this being sufficiently exact for merely finding the Longitude at sea; but if the time is required for the purpose of finding the error of a Chronometer, or, if the relative situations of two or more places are to be found by a Chronometer, greater attention to accuracy is requisite, this will be illustrated hereafter.

EXAMPLE II.

May 24, 1824, nautical time, in Latitude 38° 46′ N. the following altitudes of the Sun's lower limb were observed *west* of the meridian, together with the corresponding times by a Chronometer which was at that time fast for mean time at Greenwich 1h. 18m. 56s.; the index error of the instrument employed in observing the altitudes was 2′ 10″ subtractive, and the height of the observer's eye 16 feet: required the true Longitude of the Ship?

	Times by Chr.		Alt. ⊙'s l. limb.		
	h. m. s.			⊙'s semidiameter -	15′ 49″
	8 36 43		32° 43′ 20″	Dip - - - - 3 53 ⊙'s cor. in alt. 1 23	5 16
	37 38		30 50		
	38 25		20 10	Corr. of obsd. alt. - -	10 33
Divide by 3 - -	16		4 20	The app. astrn. time at Greenwich is May 23d, 7h. 22m. 14s.	
Means - - - - - -	8 37 35	- - - - - -	32 31 27		
Chro. fast, (sub.) -	1 18 56	Index error	— 2 10	⊙'s decln. at noon	20°37′ 39″
M. T. at Greenwich	7 18 39	Observed alt.	32 29 17	Cor. for 7h. 22m. - -	3 27
M. T. at Ship - -	4 12 50	Cor. of obs. alt.	+ 10 33	⊙'s Cor. decln. -	20 41 6
Long. in time - -	3 5 49	⊙'s True alt.	32 40 —		
Longitude -	46°27′ 15″ W.	⊙'s Polar dist.	69 19	Log.	0.02893
		Latitude - -	38 46	Log.	0.10807
		Sum - - -	140 45		
		Half Sum - -	70 22¼	Log.	4 52616
		Difference - -	37 42½	Log.	4.78650
			h. m. s.		
		Ap. time at Ship	4 16 25	Log.	9.44966
		Equ. of time -	— 3 35		
		M. T. at Ship	4 12 50		

In this example the equation of time is 3m. 35s. to be *subtracted* from the apparent time, to reduce it to mean time; the same quantity must therefore be *added* to the mean time to find the apparent time. Now in this case the mean time at Greenwich is 7h. 18m. 39s. to which 3m. 35s. being added, the sum 7h. 22m. 14s. is the apparent time at Greenwich

EXAMPLE III.

October 24th, 1824, about 9h. 44m. P. M. nautical time, in Latitude 38° 44′ N. and Longitude by account 35° 30′ W.; the observed altitude of *Altair*, west of the meridian, was 29° 5′; height of the eye 18 feet; and the time shewn by a Chronometer, when the altitude was observed, was 11h. 49m. 33s., the Chronometer being slow for mean time at Greenwich 1m. 51s.: required the Longitude of the Ship?

	h. m.		h. m. s.
Estim. astron. time at Ship 23d	9 44	Sun's R. A. at Noon, 23d.	13 51 46
Longitude in time, W.	+ 2 22	Correction for 12h. 6m.	+ 1 56
Estimated time at Greenwich	12 6	☉'s R. A. at time of observation	13 53 42
			24
		Comp. of ☉'s R. A.	10 6 18
Star's observed altitude	29° 5′		
Dip and correction in alt.	— 6		
Star's true altitude	28 59		
Star's polar dist. from N. A.	81 35	Log. 0.00470	
Latitude	38 44	Log. 0.10787	
Sum	149 18		
Half Sum	74 39	Log. 4.42278	
Difference	45 40	Log. 4.85448	
	h. m. s.		
✱'s Horary dist. W. of merid.	3 57 33	Log. 9.38983	
✱'s Right ascension	19 42 15		h. m. s.
Com. of ☉'s R. A.	10 6 18	Time of obsn. by Chr.	11 49 33
		Chr. slow for M. T. at Greenwich	+ 1 51
Sum—24=App. time at Ship	9 46 6		
Equation of time	— 15 39	Mean time at Greenwich	11 51 24
Mean time at Ship	9 30 27		
Mean time at Greenwich	11 51 24		
Longitude in time	2 20 57 = 35° 14′ 15″W.		

In this last Example, the estimated time at Greenwich is deduced from the supposed apparent time at the Ship, and the Longitude by account; but when the Time and Longitude are very uncertain, the Greenwich time should be found by means of the Chronometer, as in the two former Examples.

We shall now proceed to give some directions for finding the Errors and Rates of Time-keepers. This is a subject that ought to be well understood, for unless the Navigator knows how much a Chronometer differs from mean time at Greenwich, at any given time, he can place no confidence in the Longitude deduced therefrom.

ON FINDING

THE ERRORS AND RATES

OF

CHRONOMETERS

THERE are various modes of finding the error and rate of a Chronometer, such as by comparing it with a well-regulated astronomical clock, by transits of the Sun, or a fixed Star, over the meridian, or by equal altitudes of the Sun. These methods, however, are not in general so well adapted to the use of the practical Navigator as the following, of which we shall give some examples.

1. By a set of altitudes of the Sun, taken when that object is at a proper distance from the meridian.

2. By a set of altitudes of a fixed Star, taken when the Star is near the prime vertical

3. By the Lunar Distances.

The first of these methods is the one most used by seamen. In high Latitudes, however, when the Latitude of the place, and the declination of the Sun are of contrary names, the second method will be found more correct, because a Star may always be chosen at a proper height, and at the same time near the prime vertical. The third method is only useful at sea, but there it is the only one that can be employed with advantage; it therefore ought to be well understood by every person possessed of a time-keeper.

Altitudes, carefully observed in the usual way, may be employed to find the error of a Chronometer, but altitudes, taken by means of an artificial horizon, should always be preferred when the observer is on shore, or the ship perfectly steady; indeed, it is only in this way, that altitudes of the Stars can be employed with success in finding the rate of a time-keeper.

The artificial horizon, generally used, consists of a quantity of quicksilver, put into a shallow trough or vessel, having a glass roof to prevent the wind from disturbing the surface of the mercury. Another kind consists of a smooth reflecting surface, which is a perfect plane, and adjusted horizontally at the time of observation by means of screws and a sprit level. If a person be not in possession of either of these horizons, a little clean tar, oil, or treacle, put into a bason. will answer very well as an artificial horizon ; if the wind is strong, the bason should be covered with a piece of fine muslin, or gauze Water makes an excellent artificial horizon, when there is little or no wind, or when kept steady in the bason by means of a gauze cover.

To observe the altitude of the Sun in an artificial horizon, let the observer have the horizon directly betwixt him and the Sun, and place himself at such a distance as to see the Sun's image in the quicksilver, or other reflecting surface ; then having the proper coloured glasses turned down, on each side of the horizon glass of the Sextant, keep the Sun's image in the middle of the field of the telescope, and move the index forward until the Sun's image, reflected from the index glass of the Sextant, be brought in contact with that first seen in the artificial horizon ; then, if the one image be made exactly to cover the other, the Sextant (supposing it to have no error) will give twice the apparent altitude of the Sun's centre. But instead of making the one image cover the other, it is generally better to bring their limbs in contact, then half the angle of the nearest limbs is the apparent altitude of the Sun's lower limb, or half the angle between the farthest limbs is the apparent altitude of the Sun's upper limb.

The altitude of a fixed Star is observed in the same manner, only no coloured glasses are required ; and as the Stars have no sensible diameter, half the angle given by the instrument is the apparent altitude of the Star.

FIRST METHOD

To find the Error and Rate of a Chronometer by altitudes of the Sun, observed by means of an Artificial Horizon.

RULE.

1. When the Sun is near the prime vertical, or at least 5 points of the compass distant from the meridian, and his altitude at the same time not less than 8°, nor greater than 60° ; take a set of altitudes, and note the corresponding times by the Chronometer ; to the mean altitude, apply the index error of the Sextant, half the sum or difference will be the apparent altitude of the Sun's *upper* or *lower* limb, according as the *farthest* or *nearest* limbs of the Sun's images have been brought into contact.

2. With the apparent altitude of the Sun's limb, take the correction of the Sun's altitude from Table VI ; this correction being subtracted from the apparent altitude of the observed limb, will leave the true altitude of that limb, to which apply the Sun's semidiameter (from page III. of the month in the N. A.) by *addition* or *subtraction*, according as the *lower* or *upper* limb of the Sun has been observed, the sum or difference will be the true altitude of the Sun's centre.

3. With the Sun's true altitude and declination, together with the Latitude of the place of observation, find the apparent time, by Problem I. ; to the apparent time apply the *Equation of time*, (from page II. of the month in the N. A.) this will give the *mean time* at the place of observation. The difference between this Time and the Mean of the Times, given by the Chronometer, will be the *error* of the Chronometer for Mean Time at the meridian of the given place, and for the time of observation.

4. A few days after the first error has been found, let the error of the Chronometer be again found in the same manner ; divide the difference of these errors, or their sum, if the one be fast and the other slow, by the number of days elapsed, the quotient will be the daily *rate*, which will be *gaining* or *losing*, according as the second observation shews the watch to be *gaining* or *losing* on mean time.

After having found the rate, the last found error should be reduced to the error for mean time at Greenwich, as follows:

1. When the place of observation is in *east* Longitude, and the error of the Chronometer *fast* for mean time at that place, add the Longitude in time to the error of the watch, the sum will shew how much the watch is fast for mean time at Greenwich ; but when the Chronometer is *slow* for mean time at the place of observation, the difference between the Longitude in time, and the error of the watch, will be its *error* for mean time at Greenwich, which will be *fast* when the Longitude in time exceeds the error of the watch, but *slow* when the error of the watch exceeds the Longitude in time.

2. When the Longitude of the place is *west*, and the Chronometer *slow* for mean time at that place, the sum of its error, and the Longitude in time, will be its error *slow* for mean time at Greenwich, but when the watch is *fast* for mean time at the place of observation, the difference between the Longitude in time, and the error of the watch, will be its *error* for mean time at Greenwich, *fast* when the error of the watch is greater than the longitude in time; but *slow* when the Longitude in time exceeds the error of the watch.

EXAMPLE I.

1823. At Port Louis Mauritius, in Latitude 20° 10′ S., and Longitude 57° 29′ 30″ E. December 8, about 8h. 50m. A. M. apparent civil time, the following altitudes of the Sun's nearest limbs were observed in an artificial horizon, together with the corresponding times by a Chronometer, the error of the Sextant was 2′ 50″ additive: required the error of the Chronometer for mean time at Port Louis?

	Times by Chr.		Dble alt. ⊙'s l. l.		
	h. m. s.				
	5 2 5		90°42′ 20″	The estimated astronomical time at	
	3 51		91 34 50	Port Louis is Dec. 7, at	20h. 50m.
	5 40		92 28 40	Long. of Pt. Louis in time—	3 50
Divide by 3	11 36		15 50	Greenwich time, 7th Dec.	17 0
Means	5 3 52		91 35 17	⊙'s Dec. at noon, 7th.	22°34′ 41″ S.
		Index error	+ 2 50	Corr. for 17h. 0m.	+ 4 47
		Divide by 2 -)	91 38 7	⊙'s Corr. Declination	22 39 28
					90
				⊙'s Polar distance	67 20 32

App. alt. of ⊙'s lower limb	45 49 4	
Correction from Table VI.	— 50	
True alt. of ⊙'s lower limb	45 48 14	
Sun's semidiameter	+ 16 16	
True alt. of ⊙'s centre	46 4 30	
Sun's polar distance	67 20 32	Log. 0.03488
Latitude	20 10 0	Log. 0.02748
Sum	133 35 2	
Half Sum	66 47 31	Log. 4.59558
Difference	20 43 1	Log. 4.54870
	h. m. s.	
App. time at Port Louis	8 50 47 .7	Log. 9.20664
Equation of time	— 8 10 .3	719
Mean time of observation	8 42 37 .4	Parts. 55 = 7s .7
Time of observation by Chr.	5 3 52 .0	
Chr. *slow* for M. T. at Port Louis	3 38 45 ·4	

About 9 A. M. on the 14th of December, the same Chronometer was found *slow* for mean time at Port Louis 3h. 39m. 27^{s} .2, so that the watch lost 41^{s} .8, in 6 days, and 41^{s} .8 ÷ 6 = 6^{s} .97, (or .7$^{s.}$) the daily rate losing

To find the Error for noon at Greenwich on the 14th of Dec.

	h.	m.	s.
Longitude of Port Louis 57° 29′ 30″ E. in time	3	49	58
Error of the Chronometer for mean time at Port Louis at 9 A. M. 14th Dec.	3	39	27
Error of the Chronometer for mean time at Greenwich, at time of obsn. *fast*		10	31
Now 9 A. M. at Port Louis answers to 5h. 10m. A. M. at Greenwich; therefore the time of observation is 6h. 50m. from noon at Greenwich, and the proportional part of the daily rate for 6h. 50m is nearly 2s. (to subtract)		—	2
Error of the Chronometer, *fast* for *mean noon* at Greenwich, 14th Dec.		10	29

Here the Chronometer being fast for mean time at Greenwich, and losing 7s. daily, it is plain that 7s. must be subtracted from 10m. 29s. to have the error for noon on the 15th Dec.; 14s. for the 16th, and so on. When the *error* and *rate* are of different names, the *error* will change its name when the accumulated *rate* exceeds the original *error*. For instance, in the above example the error will be diminished by 7s. daily, until the 22d March, 1824, on that day at noon the error of the watch is only 6s. fast for mean time at Greenwich, therefore on the 23d the error will be 1s. slow; on the 24th it will be 8s. slow, and so on.

EXAMPLE II.

June 7, 1824, at New York, in Latitude 40° 42′ N. and Longitude 74° 7′ W. about 3h. 40m. P. M. apparent civil time, the following altitudes of the Sun's upper limb were taken in an artificial horizon, and the corresponding times by a Chronometer, the index error of the Sextant being 1′ 40″ subtractive: required the error of the Chronometer for mean time at New York?

	Times by Chr. h. m. s.		Dble alt. ☉'s up. l.
	3 20 37		82°42′30″
	21 43		82 12 40
	22 51		81 42 0
Divide by 3 - -)	131		37 10
Means - - - -	3 21 43.7	- - - -	82 12 23
		Index error -	— 1 40
		Divide by 2 -	82 10 43

The estimated astronomical time at N. York is 7th Dec.	3h. 40m.
Longitude in time W.	+ 4 56
Time at Greenwich	- 8 36
☉'s dec. at noon 7June	22°47′ 16″
Corr. for 8h. 36m. -	+ 1 59
☉'s Corr. declination	22 49 15
	90
☉'s polar distance -	67 10 45

Apparent altitude ☉'s upper limb -	41 5 22	
Correction from Table VI. - - -	— 59	
True alt. ☉'s upper limb - - -	41 4 23	
Sun's semidiameter - - - - - -	— 15 47	
True alt. of ☉'s centre - - - -	40 48 36	
Sun's polar distance - - - - -	67 10 45	Log. 0.03540
Latitude - - - - - - - - - -	40 42 0	Log. 0.12025
Sum - - - - - - - - - - -	148 41 21	
Half Sum - - - - - - - - -	74 20 40	Log. 4.43109
Difference - - - - - - - - -	33 32 4	Log. 4.74228
	h. m. s.	
App. time of observ. at New York	3 40 3.5	Log. 9.32902
Equation of time - - - - - - -	— 1 28.9	881
Mean time of obsn. at New York	3 38 34.6	Part 21 = 3s .5
Time of observation by Chron. - -	3 21 43.7	
Chro. slow for M. T. at New York	16 50.9	

On the 17th of June, at 3h. 50m. the same Time-keeper was found slow for mean time, at the same place, 17m. 39s. the Chronometer has therefore lost $48^{s}.1$ in 10 days; and $48_{s}.1 \div 10 = 4^{s}.81$ the daily *rate* losing.

To find the Error at Greenwich for noon on the 17th June.

		h.	m.	s.
Longitude of New York 74° 7′ W. in time - - - - - - - - - - -	=	4	56	28
Chronometer slow for mean time at New York at 5h. 50m. P.M. 17th, add	-	0	17	39
Chronometer slow for mean time at Greenwich at time of observation - - -		5	14	7.0
Proportion of daily rate for 8h. 36m. - - - - - - - - - - - - - - -	+			1.7
Chron. slow for mean noon at Greenwich 17th June, 1824 - - - - - - -		5	14	5.3

Here we may call the error 5h. 14m. 5s. and the daily rate 4s. 8, it being always sufficient for nautical practice to use the nearest second of the *error*, and nearest tenth of a second of the *rate* of a Chronometer. But in the work to find the *error* on different days, for the purpose of ascertaining the *rate*; the fractions of seconds of time ought not to be neglected.

Altitudes observed on different days, for the purpose of finding the rate of a Time-keeper, should always be taken on the same side of noon, and as near the same time of the day as possible. The interval between the observations ought not to be less than 4 days, nor greater than 12 or 14; for when the interval is only 1 or 2 days, a small error in either of the observations will materially affect the rate; and if the interval be too long, any irregularity in the going of the watch is not so likely to be detected.

When the *error* and *rate* of one Chronometer are found, it is very easy to ascertain the *errors* and *rates* of any number of watches, by comparing each at two separate times with the one whose error and rate are known. For example, Let the Chronometer, of which the error and rate is found in Example II. be called No. 1, it is required to find the error and rate of a Chronometer, No. 2.

	h.	m.	s.
June 7.—Time by Chronometer, No. 1.	3	26	29
Time by Chronometer, No. 2.	2	39	—
No. 2 Slow of No. 1, at 3h. 26m. on 7 June	0	47	29

	h.	m.	s.
June 17.—Time by Chronometer, No. 1.	3	54	23
Time by Chronometer, No. 2.	3	48	
No. 2 Slow of No. 1, at 3h. 54m. 17 June	0	46	23

Here the interval being so nearly 10 days, may be taken as such; and as No. 2 has gained 1m. and 6s. on No. 1, during that time, it has therefore gained $6^s.6$ daily on No. 1: but the rate of No. 1 is $4^s.8$ losing, hence the rate of No. 2 is $= 6^s.6 - 4^s.8 = 1^s.8$ gaining.

As the rate of No. 2 is small, it will be sufficient to apply the difference of the times shewn by the Chronometers on that day, to the Error of No. 1, for noon at Greenwich, on the 17th June. Now No. 1 is 5h. 14m. 7s. slow for mean time at Greenwich, when the observation is made on the 17th June, and No. 2 is 46m. 23s. slow of No. 1 at the same time; therefore No. 2 is 6h. 0m. 30s. slow for mean time at Greenwich on the 17th June, and its daily *rate* is $1^s.8$ gaining.

Or the errors of No. 2 for mean time at New York, when the observations were made on the 7th and 17th June, may be found by comparing it with No. 1, and by these errors the rate and error of No. 2 may be deduced in the same manner as those of No. 1. Thus, on the 7th June No. 1 is 16m. 51s. slow for mean time at New York, and at the same time No. 2 is 47m. 29s. slow of No. 1; therefore No. 2 is 1h. 4m. 20s. slow for mean time at New York on the 7th June, and on the 17th June No. 1 is 17m. 59s. slow for mean time at New York; and at the same time No. 2 is 46m. 23s. slow of No. 1, therefore No. 2 is slow for mean time at New York 1h. 4m. 2s. on the 17th June. Hence the Chronometer, No. 2, has gained 18s. in 10 days, which gives the daily *rate* 1s, 8 gaining, as before; and by adding the 1h. 4m. 2s. the error of the watch on the 17th, to 4h. 56m. 28s., the Longitude of New York in time, the sum 6h. 0m. 30s. is the error of No. 2 for noon at Greenwich.

When the Rates and Errors of several watches are to be deduced from the same observations, they should each be compared with the one of which the time is noted, as near to the time of observation as possible, that the rates, &c. of the other watches may not be affected by any irregularity in the going of the one by which the time is taken.

SECOND METHOD.

To find the Error and Rate of a Chronometer by altitudes of a fixed Star, taken by means of an artificial horizon.

RULE.

1. Choose a Star, of which the declination is of the same name as the Latitude of the place of observation, find, in Table IX. the altitude by which the apparent time may be found with the greatest accuracy, and let the altitude of the Star be observed when the angle on the instrument is as near to twice the altitude found in Table IX. as possible; then take a set of altitudes of the Star, with the corresponding times, by the Chronometer, in the same manner as in the last method.

2. To the mean double altitude, apply the index error of the Sextant, which will give *twice* the apparent altitude; from the apparent altitude subtract the correction of the Star in altitude, Table VI. the remainder will be the *true* altitude of the Star.

3. Take the Sun's right ascension from the Nautical Almanac, for the noon of the given astronomical day, and reduce it to the time of observation, by Table X.; also let the right ascension and declination of the Star be accurately reduced to the time of observation.*

4. With the Star's true altitude and declination, together with the Latitude of the place of observation, find the apparent time of observation, by Problem II.; to the apparent time, apply the equation of time, which will give the mean time of observation; the difference between this, and the mean of the times of observation by the Chronometer, will be its error for mean time, and by finding the *error* at some subsequent time, the rate is deduced as before.

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* If one of the 24 stars, of which the right ascensions and declinations are given in the Nautical Almanac for every tenth day of the year, can be used, it should always be preferred.

EXAMPLE.

Suppose that on the 6th of January, 1824, about 7h. 59m. P. M. civil time, in Latitude 56° 34′ N. and Longitude 2° 35′ W. the following altitudes of *Castor* were observed east of the meridian, in an artificial horizon, with the corresponding times by a Chronometer, the index error of the Sextant was + 40″: required the error of the Chronometer for mean time at the time of observation.?

	Times by Chr. h. m. s.	Dble alts. of *
	8 7 15	80° 4′ 00″
	8 58	80 37 10
	10 46	81 11 40
Divide by 3 - - -)	26 59	112 20
Means - - - -	8 8 59.7	80 37 27
Index error -		+ 40
Divide by 2)		80 38 7

	h. m. s.
Est time at place of obsn.	7 59
Long. in time, W. -	+ 10
Est. time at Greenwich -	8 9
⊙'s R. A. at noon 6 Jan.	19 6 0.6
Corr. for 8h. 9m. - -	+ 1 29.3
⊙'s Corr. R. A. - -	19 7 29.9
	24
Comp. of ⊙'s R. A. -	4 52 30.1

Star's apparent altitude - - - -	40 19 4	
Correction from Table VI. - - - -	— 1 7	
Star's true altitude - - - - -	40 17 57	
Star's polar distance - - - - -	57 44 8	Log. 0.07284
Latitude - - - - - - - - - -	56 34 0	Log. 0.25887
Sum - - - - - - - - - -	154 36 5	
Half Sum - - - - - - - -	77 18 3	Log. 4.34209
Difference - - - - - - - -	37 0 6	Log. 4.77948
	h. m. s.	
Star's distance W. of meridian - -	19 42 23.4	Log. 9.45328
Comp. of ⊙'s R. A. - - -	+ 4 52 30.1	
Star's right ascension - - - -	+ 7 23 24.5	
Sum — 24 = App. time of obsn. -	7 58 18.0	
Equation of time - - - - - - -	+ 6 3.4	
Mean time of observation - - -	8 4 21.4	
Mean of times by Chronometer -	8 8 59.7	
Chronometer fast for mean time -	4 38.3	

On the 13th of the same month, at 7h. 40m. P. M. civil time, the error of the Chronometer was again found by *Castor*, and was then 5m. 21s. fast for mean time. Hence the gain in 6 days 23h. 42m. is $42^s.7$; but the interval being so near 7 days, may be so esteemed, and $42^s.7 \div 7 = 6s.1$ the daily rate, gaining.

To find the Error for mean time at Greenwich on the 13th Jan.

	h.	m.	s.
Longitude of the place of observation 2° 35′ W. in time - - - - -	0	10	20
Chron. fast for mean time at the place of obsn. at 7h. 40m. P. M. 13th -	0	5	21
Chronometer slow for mean time at Greenwich, at time of observation -	0	4	59
Proportion of daily rate for time past noon at Greenwich, viz. 7h. 50m. -	+		2
Chronometer slow for mean noon at Greenwich, 13th Jan. 1824. - - -	0	5	1

The right ascension and polar distance of *Castor* were taken from page 155 of the Nautical Almanac, for 1824. If the time found by observation differs more than 3 or 4 minutes from the estimated time, the operation of finding the proportional part of the Sun's right ascension ought to be repeated, using the time found by observation instead of the estimated time; this proportional part being added to the Sun's R. A. at noon, will give the correct right ascension at the time of observation; then with the Sun's right ascension thus corrected, the Star's meridian distance, and right ascension, deduce the apparent time as before.

Equal altitudes of a fixed Star, observed at an interval of a few days, may be employed to find the *rate* of a Chronometer. This is a very easy method of finding the rate of a watch, and may be used with advantage in any part of the habitable globe, when the stars can be seen; but in high Latitudes, when the Sun's declination is of a different name, from the Latitude, this is the best method for merely finding the *rate* that can be employed by a person who is, only, provided with a Sextant and an artificial horizon.

RULE 1. Choose a Star, of which the altitude is greater than 10°, and less than 60°, when it is at or near the prime vertical; and when the Star is in this position, on any evening, observe its altitude, and note the corresponding time by the Chronometer.

2. In an interval of from 3 to 14 days, again observe the same Star, when its altitude is equal to that first observed, and note the time by the Chronometer.

3. Take the time from Table A. page 39, for the number of days between the observations; subtract this time from the time shewn by the Chronometer, when the first altitude was observed, the *remainder* will be the time that the Chronometer would shew when the second altitude is observed, if it were to keep mean time exactly. Now it is plain, that if the time shewn by the Chronometer at the instant, the second observation is made, be *greater* than the *remainder*, the watch is gaining; but if the time by the watch of the second observation be *less* than the *remainder*, the watch is losing; the difference, in either case, being divided by the number of days in the interval, will shew the daily rate.

EXAMPLE.

December 1, 1824, in Latitude 51° 30′ N. the altitude of Aldebaran, observed in an artificial horizon, was 41° 5′ 20″, and the time shewn by a Chronometer at the instant the altitude was observed was 6h. 56m. 44s.; on the 10th of December, when Aldebaran had the same altitude, the time by the Chronometer was 6h. 21m. 3s.: required the *rate* of the Chronometer?

	h.	m.	s.
Time on 1st. Dec. when the Star's altitude was 41° 5′ 20″ - - - - - - -	6	56	44.0
Time from Table A. for interval of 9 days - - - - - - - - - - - -	—	35	23.2
Remainder, or time the Chr. ought to shew 10th Dec. when Star's altitude is 41° 5′ 20″) - - - - - - - - - - - - - - - - - - -	6	21	20 8
Time shewn by Chr. on the 10th Dec. when the Star's alt. was 41° 5′ 20″	6	21	3.0
Loss of the Chronometer in 9 days, (divide by 9) - - - - - - - -			17.8
Daily rate of the Chronometer, losing - - - - - - - - - - - -			1.98

THIRD METHOD.

To find the Errors and Rate of a Chronometer by means of the Lunar Distances.

RULE.

1. When there is a good opportunity for observing the distance between the Sun and Moon, or between the Moon and a Star, observe several sets of Distances with the Altitudes of the objects, and note the times by the Chronometer when the observations are made.

2. Deduce the apparent distance and apparent altitudes of each set, and from these find, by Problems III. and IV. the apparent time at Greenwich answering to each set of distances; to each of these times apply the Equation of time, which will give the *mean time* at Greenwich for each set of distances; the difference between the *mean time* at Greenwich, as found by any particular set, and the time shewn by the Chronometer when that set is observed, will shew the *Error* of the watch, for mean time at Greenwich; find the Error for each set, and take their mean as the *Error* for *mean time* at Greenwich, for the hour, nearest to the mean of the times of observation.

3. At an interval, of at least 8 or 10 days, again find the Error of the Chronometer; then having the *Errors* at two given times, find the Rate, as in the foregoing methods; and also the Error for the noon at Greenwich, nearest to the last found Error.

EXAMPLE.

At sea, in Longitude 18° 15′ W. by account, in the year 1824, February 9th, about 2h. 10m. P. M. nautical time, the following distance between the Sun and Moon, with the altitudes of these objects, were observed, and the corresponding times shewn by a Chronometer noted, the height of the eye being 14 feet: required the *Error* of the Chronometer for *mean time* at Greenwich at the time of observation.

	Times by Chron.	Dist. of ☉ and ☽'s nearest limbs.	Alts. of ☉'s lower limb.	Alts. of ☽'s upp. limb.
	h. m. s			
	3 44 2	96° 28′ 20″	59° 48′ 0″	23° 2′ 0″
	45 11	28 50	34 0	15 0
	46 11	29 20	18 0	26 0
Sums - - -	24	26 30	100 0	43 0
Means - - -	3 45 8	96 28 50	59 33 20	23 14 20
Index errors -	- - - -	+ 2 30	0 0	0 0
Semidiameters	- - - -	+ 32 6	+ 16 14	— 15 52
Dip of hor. -	- - - -	- - - -	— 3 34	— 3 34
App dist. & alts	- - - -	97 3 26	59 46 0	22 54 54

	h. m.
Est. astron. time at Ship Feb. 8th, at	2 10
Long. in time W. -	+ 1 13
Es. time at Greenwich	3 23
☽'s Semid. at noon, 8th Feb. - -	15′ 43″
Corr. for 3h. 23m.	+ 2
☽'s Horiz. semid.	15 45
☽'s Augmentation	7
Sun's semidiameter	16 14
Sum of semidirs. -	32 6

Moon's hor. par. at noon	0°57′41″			
Corr. for 3h. 23m.	+ 8			
Moon's corr. hor. par.	0 57 49	Log. 0.0332		Log. 0.0332
Sun's app. alt.	59 46 —	Log. 0.5235	☽'s app. alt. 22° 55′	Log. 0.8696
App. dist.	97 3 26	Log. S. 0.9967		Log. T. 1.9077
First correction	+ 4 9 40	Log. 1.5534		
Second correction	+ 4 57 13			Log. 2.8105
Third correction	+ 2 41			
Sum—10°=True dist.	96 13 0			
Dist. in N. A. at 3h.	96 8 3	First diff. 0° 4′ 57″	P. Log. 1.5607	
Dist. in N. A. at 6h.	97 41 21	Second diff. 1 33 18	P. Log. 0.2854	

	h. m. s.	
(Add. 3h.) App. time at Greenwich	3 9 33	P. Log. 1.2753
Equation of time	+ 14 32	
Mean time at Greenwich	3 24 5	
Time of observation by Chronometer	3 45 8	
Chronometer fast for M. T. at Greenwich	0 21 3	

By 4 other sets taken on the same afternoon, the results were as follows: (Let the set, already worked, be called No. 1)

	h. m. s.		Errors of the Chr. for M.T. at Greenwich. m. s.
Time by Chr. when set No. 2, was observed	3 50 58		
Mean time at Greenwich by No. 2	3 30 12	Diff.	20 46
Time by Chr. when set No. 3, was observed	3 55 48		
Mean time at Greenwich by No. 3	3 34 40	Diff.	21 8
Time by Chr. when set No. 4, was observed	3 59 56		
Mean time at Greenwich by No. 4	3 38 51	Diff.	21 5
Time by Chr. when set No. 5, was observed	4 10 53		
Mean time at Greenwich by No. 5	3 40 51	Diff.	20 12
Error by No. 1, at Greenwich, mean time, 5h. 24m.			21 3
Sum of errors		(divide by 5)	104 14
Chronometer *fast* for *mean time* at Greenwich at 4h. Feb. 8th			20 51

On the 22d of February, at 23h., Greenwich time, the same Chronometer was found, by 6 sets of distances between the Sun and Moon, to be 22m. 53s. fast for mean time at Greenwich. Here the interval is 14d. 19h. and the gain, during that time, is 2m. 2s.=122s., and $\frac{122s.}{14d.\ 19h}$ or $\frac{122s.}{14.79}$ = 8s.25, the daily gain of the Chronometer is therefore 8$\frac{1}{4}$s.; and its *Error* for mean time at Greenwich, at noon, on the 23d February, is 22m. 53s. fast.

It is not necessary that all the observations, for finding the Errors at the beginning or end of the interval, should be made on the same day, nor that the Moon's distances should be all taken from the same object. When the observations, at the beginning or end of the interval, are made on different days, set down all the times at Greenwich with their respective errors opposite to them, find the sum of the *times*, and also that of the *errors ;* these sums being divided by the number of times, or errors, will give the required epoch and the corresponding error of the Chronometer. For example, Let the times at Greenwich, and corresponding errors of a Chronometer for mean time at that place, be as follows :

1824.	Mean time at Greenwich				Errors of Chronometer *slow* for mean time at Greenwich.			
No.		d.	h.	m.	h.	m.	s.	
1.——	March - -	5	4	30	2	6	28	By ☽ and ⊙
2.	ditto - -	6	5	0	2	7	11	☽ and ⊙
3.	ditto - -	6	9	30	2	6	53	☽ and Jupiter.
4.	ditto - -	7	4	0	2	7	18	☽ and ⊙
5.	ditto - -	7	10	0	2	6	20	☽ and Pollux.
Sums, -	(divide by 5)	32	9	0		34	10	
Means	- - - - -	6	11	24	2	6	50	

Here the mean of the times at Greenwich is March 6, at 11h. 24m. and the mean error, or that which answers to the mean Greenwich time, is 2h. 6m. 50s.; and by again finding the error of the watch for some subsequent time, the rate may be deduced as before.

The same degree of accuracy is not to be expected in this method of settling the *rate* of a time-keeper, as may be obtained by altitudes of the Sun or Stars taken on shore; it is, however, as has been before observed, the only method that can be employed at sea, and the Navigator, who carefully practises it, will seldom find 5 miles of error in the Longitude, as given by a tolerably good Chronometer, during a passage of any length, for in this case we do not depend upon the exact going of the Chronometer, for a long period, but merely from one set of Lunar Observations to another.

On the Management of Chronometers.

Unless particular care be taken of Chronometers, it is not to be expected that such delicate pieces of mechanism can continue to go with regularity, it may therefore be of service to those who have not had much experience in the use of Time-keepers to attend to the following *Remarks:*

1. A Chronometer should be wound up at regular intervals, it being very improper to let one, that is generally wound up between 8 and 9 o'clock in the morning, run till noon. Great care should be taken to avoid circular motion, therefore when winding up a Chronometer, it must be kept steady, and the key only turned.

2. Chronometers should be placed so as to be as little exposed as possible to sudden shocks, from the sea striking the Ship, or from the shutting of doors, &c.: they ought not to be exposed to a current of air; and nothing *magnetic* should be allowed to remain near them.

3. It is very improper to make a practice of taking a Chronometer on deck, when observing altitudes, merely to find the Longitude; for, besides the risk of accidents, it is hardly possible to carry about a Chronometer without giving it too much circular motion. Any sudden change of temperature ought also to be avoided: it is therefore proper to take the times of observing the altitudes by a common watch, and find the difference between it and the Chronometer, immediately before or after the observation: then this difference being applied to the mean of the times of observation by the watch, will show the time by the Chronometer answering to the mean altitude.

4. If a Chronometer be allowed to run down, it will not commence going again, after being wound up, until it gets one or two pretty

quick quarter turns in a horizontal direction, its face being upwards. After being set going, a Chronometer will sometimes keep the same *rate* it had before it was let down; this, however, is uncertain, and no dependance can be placed on it, until a fresh *rate* and *error* be obtained.

5. When a Chronometer is carried to or from the Ship, it should be fastened by means of the studs and screws, to prevent it from traversing on its gimbles. Great care should be taken by a person carrying a Chronometer, that it gets no sudden jerks, or quick circular motion. If the rate of a Chronometer can be properly ascertained, when it is on board, it ought not to be taken on shore for that purpose.

Note.—In a paper by Mr. Fisher, published in the Philosophical Transactions for 1820, page 196, it is stated that Chronometers generally go faster on board of a Ship than on shore. Mr. Fisher ascribes this to the magnetic effect of the iron in the Ship on the Steel part of the balance of a Chronometer. This is a subject that deserves farther attention from all intelligent navigators.

* * *

Table A contains the acceleration of the fixed Stars, in *mean time* from 1 day to 60. If the acceleration be wanted for any time exceeding 60 days, it may be found by adding together the accelerations answering to the days in the Table that make up the given time.

For example, let the acceleration for 112 days be required, here 60 + 52 = 112.

	h.	m.	s.
Acceleration for 60 days - - - - - - -	3	55	54.5
Acceleration for 52 days - - - - - - -	3	24	27.2
Acceleration for 112 days - - - - - - -	7	20	21.7

This Table is given for the method of finding the Rate of a Chronometer, by equal altitudes of a fixed Star, observed on different days. It will also answer for the method by transits of the fixed Stars.

TABLE A, Acceleration of the Fixed Stars, in Mean Time.

Sidereal Days.	Acceleration.	Sidereal Days.	Acceleration.	Sidereal Days.	Acceleration.	Sidereal Days.	Acceleration.
	h. m. s.		h. m. s.		h. m. s.		h. m. s.
1	0 3 55.9	16	1 2 54.5	31	2 1 53.1	46	3 0 51.8
2	0 7 51.8	17	1 6 50.4	32	2 5 49.1	47	3 4 47.7
3	0 11 47.7	18	1 10 46.3	33	2 9 45.0	48	3 8 43.6
4	0 15 43.6	19	1 14 42.3	34	2 13 40.9	49	3 12 39.5
5	0 19 39.5	20	1 18 38.2	35	2 17 36.8	50	3 16 35.4
6	0 23 35.4	21	1 22 34.1	36	2 21 32.7	51	3 20 31.3
7	0 27 31.4	22	1 26 30 0	37	2 25 28.6	52	3 24 27.2
8	0 31 27.3	23	1 30 25.9	38	2 29 24.5	53	3 28 23.1
9	0 35 23.2	24	1 34 21.8	39	2 33 20.4	54	3 32 19.0
10	0 39 19.1	25	1 38 17.7	40	2 37 16.3	55	3 36 14.9
11	0 43 15.0	26	1 42 13.6	41	2 41 12.2	56	3 40 10.8
12	0 47 10.9	27	1 46 9.5	42	2 45 8.1	57	3 44 6.8
13	0 51 6.8	28	1 50 5.4	43	2 49 4.0	58	3 48 2.7
14	0 55 2.7	29	1 54 1.3	44	2 53 0.0	59	3 51 58.6
15	0 58 58.6	30	1 57 57.2	45	2 56 55.9	60	3 55 54.5

EXPLANATION

OF

THE TABLES.

TABLE I.

To Reduce Longitude into Time, or Time into Longitude.

The use of this Table will be easily understood by attending to the following Examples:

I.

What Time answers to Longitude 77° 42′ 30″?

				h.	m.	s.
77°	0′	0″	=	5	8	0
	42	0	=		2	48
		30	=			2
Time required - - - - - - - -				5	10	50

II.

Required the Longitude answering to 7h. 23m. 28s.?

h.	m.	s.				
7	20	0	=	110°	0′	0
	3	28	=		52	0
Longitude required - - - - - -				110	52	0

This Table being chiefly intended to turn Longitude into time, and the contrary, is only extended to 180°, and to 12h. it is however easy to find the time answering to an arch greater than 180°, or the corresponding arch for a given time exceeding 12h. For Example, Let it be required to turn the Moon's right ascension 269° 21′ 44″ into time?

						h.	m.	s.
Moon's right ascension - -	269°	21′	44″					
Subtract - - - - - - -	180	0	0		=	12	0	0
Remainder - - - - - - -	89	21	44	and 89°	=	5	56	0
				21′	=		1	24
				44	=			3
Moon's right ascension in time - - - - - - - - - -						17	57	27

In a similar manner may the *arch* be found, for any time, between 12 and 24 hours.

TABLE II.

Dip of the Horizon.

This Table contains the Dip, or Depression of the visible Horizon of the Sea, when the sight is unobstructed. The dip is always to be subtracted from altitudes observed by the fore observation; but if the back observation be used, the dip must be added to the observed altitude.

TABLE III.

Dip of the Horizon, at different Distances, from the Observer.

If the Image of the Sun, or any other celestial object, be brought in contact with the surface of the water, at any point nearer to the Observer than the most distant visible horizon, it is plain that the Dip will be greater than that given in Table II.; therefore in situations near the Land, when the Sun or other object is over it, the Dip is to be taken from this Table. Thus, if the height of the eye of an observer be 20 feet, and his distance from the Land 1 mile, the Dip is 11 minutes.

The distance from the Land can generally be estimated with sufficient accuracy, particularly if the distance exceeds a mile, and the height of the eye not greater than 20 feet: If the height be more than 20 feet, and distance less than a mile, it is necessary to be very exact in both the arguments.

TABLE IV.

Moon's Augmentation.

The Moon's apparent semidiameter, as given in the Nautical Almanac, is adapted to her distance from the centre of the Earth. But when the Moon is in the zenith of any place, she is nearer to an observer, in that place, than she is to the Earth's centre by about 4000 English miles, (the diameter of the Earth being nearly 8000 miles,) now the Moon's mean distance from the Earth's centre being about 240,000 miles, it is evident that the Moon's diameter will appear under an angle $\frac{1}{60}$th part greater to a person who is nearer to her by

4000 miles, for 240,000 ÷ 4000 = 60; and as the Moon's semidiameter, when at her mean distance from the Earth, is about 15′ 42″, the greatest augmentation of the Moon's semidiameter will in this case be 15″ 42‴, that is, one 60th of 15′ 42″. When the Moon is nearer to the Earth than her mean distance, the greatest augmentation of semidiameter exceeds 15″ 42‴, and the contrary is the case, when the Moon's distance is greater than her mean distance from the Earth.

When the Moon is in the horizon of any place, her distance from that place is so nearly the same as the distance from the Earth's centre, that the augmentation is insensible. Supposing the Moon's distance from the earth to remain the same, as her altitude increases she approaches an observer, and therefore, at any altitude between 0° and 90°, the augmentation will be between 0″, and the Moon's greatest augmentation of semidiameter.

TABLE V.

Contraction of Semidiameter of the Sun or Moon.

As the effect of refraction is greater on the lower limb of the Sun, or Moon, than on the upper limb, the apparent vertical diameter is always less than the apparent horizontal diameter, in a quantity equal to the difference of the refractions on the upper and lower limbs. Thus, if the observed altitude of the Sun's lower limb be 3° 0′, when his diameter, by the Nautical Almanac, is 32′, the observed altitude of the upper limb will not be 3° 32′, but only 3° 30′ 30″, because the refraction on an object, when it is apparently 3° above the horizon, is 14′ 36″; but when the apparent altitude of an object is 3° 30′, the refraction is only 13′ 6″, in this case, therefore, the horizontal diameter of the Sun would be greater than the vertical diameter by 1′ 30″, or the contraction of the vertical semidiameter would be 45″.

When the distance between the Sun and Moon is observed, if the altitude of either object be less than 12°, and the altitude of the other above 20°, the correction from this Table ought to be *subtracted* from the semidiameter of the lower object, before it is applied to the observed distance.

When the altitudes of the objects are nearly the same, when the distance is observed, no correction is necessary. When the objects are both in the same azimuth circle, or in opposite azimuth circles, a line from the centre of either object, to that part of the limb from which the distance is taken, will make an angle of 90° with the horizon, therefore, the whole effect of the difference of refraction on the centre of the object, and the observed limb, must be applied to the semidiameter. When the objects are in any other position, the angle with the horizon may be estimated with sufficient exactness, by taking notice of the inclination of the plane of the Sextant with the horizon, at the time the distance is observed.

The inclination which a plane, passing through the two objects, has to the horizon, is found at the top; and the apparent altitude, in the left hand side column under the former, and opposite to the latter, is the contraction of semidiameter.

EXAMPLE.

The Moon's semidiameter being 16′ 4″ by the Nautical Almanac, when her apparent altitude is 6° 40′, and the inclination to the horizon of the plane passing through the Sun and Moon 78° : required the semidiameter to be applied to the observed distance?

Moon's horizontal semidiameter		16′ 4″
Moon's augmentation of semid. by Table IV.	+	2
Contraction of the Moon's semidiameter	—	15
Semid. to be applied to the observed distance		15 51

TABLE VI.

Corrections of the Apparent Altitudes of the Sun and Stars.

The Sun's correction in this Table is the mean refraction in altitude, lessened by the effect of the parallax of the Sun, on the same altitude. The Star's correction is the mean refraction in altitude.

Note.—The correction of the Sun's altitude should be taken out for the apparent altitude of the observed limb, and not for the apparent altitude of the Sun's centre. By this means the error in altitude, arising from the contraction of the Sun's vertical semidiameter, will be avoided.

TABLE VII

To Correct the Mean Refraction.

The corrections in Table VI. are calculated for that state of the Atmosphere, in which the height of the Barometer is 29. 6 inches, and the height of Farenheit's Thermometer 50° ; but a variation in either the *weight* or *temperature* of the Air, causes a difference in the quantity of the refraction, it is therefore necessary when the altitude of an object is low, and great accuracy required, to apply the corrections from this table, to the correction found in Table VI. for any variation, in the height of the Barometer, from 29. 6 inches, and in the height of the Thermometer, from 50 degrees.

EXAMPLE.

The apparent altitude of the Sun being 6° when the Barometer stands at 29. 75 inches, and the Thermometer at 76° : required the proper correction of the Sun in altitude.

Correction for Sun's apparent altitude 6° from Table VI.		8′ 18″
Opposite app. alt. 6°, and under height of Ther. 76°, is	—	31
Opposite app. alt. 6°, and over height of Bar. 29. 75 is	+	2
Correction required		7 49

TABLE VIII.

Correction of the Moon's Semidiameter, or Horizontal Parallax for any given time, between Noon and Midnight, or of the Sun's Declination for a given time, from the preceding noon.

This is a Table of proportional parts. The corrections to be applied to the Moon's semidiameter and horizontal parallax, as given in the Nautical Almanac at Noon or Midnight, so as to reduce them to any other Greenwich time, may be accurately found by this Table. If the Sun's Declination be required to the nearest second, the correction may be found by Table X.

TABLE IX.

Altitudes by which the Apparent Time may be found with the greatest accuracy.

When an object is observed in the prime vertical, the apparent time, deduced from its altitude, is likely to be more correct than when the object is in any other position, because, when a body bears due *east* or *west*, its change of altitude is quickest, and any probable error, either in the Latitude of the place of observation or in the Declination of the observed object, will cause very little error in the time: and the best situation of an object that does not come to the prime vertical is when its motion coincides with an azimuth circle. This Table will shew the altitude of an object when in either of these positions.

For example. The Latitude of place being 51° 30′ N., and the Declination of the Sun or a Star 21° N.; the best time to observe the altitude, for ascertaining the apparent time, is when the altitude is about 27°; or if the Latitude of a place be 14° S., and the Declination of an object 24° S., the most favorable altitude for finding the time is 57°.

This table is only useful when the Latitude of the place of observation, and the Declination of the object, are of the same name. When these are of different names, the best time to observe the altitude is when its height is from 5° to 15°, according to circumstances.

TABLE X.

Logarithms for finding the Correction of the Sun's Declination, &c. &c

This table is chiefly intended to find the proportional part of the daily variation of the Sun's Declination, or Right Ascension, for any given time at Greenwich; the numbers at the top or bottom of the table may be esteemed as *Hours*, *Degrees*, or *Minutes*, and those in the side columns as *Minutes* or *Seconds*, according as the numbers at the top are estimated.

PROBLEM I.

To find the Proportional Part of the Daily Variation of the Sun's Declination or Right Ascension, for any given time at Greenwich.

RULE.

Add together the Logarithms of the Greenwich Time, and the Daily Variation, the Sum will be the Logarithm of the Proportional Part required.

EXAMPLE I.

Suppose the variation of the Sun's declination in 24h. is 19′ 37″: required the Proportional Part for 15h. 49m.?

	h.	m.	
Greenwich time - - - - - - - - - -	15	49	Log. 0.1811
Variation in 24 hours - - - - - - - -	19′	37″	Log. 0.0876
Proportional part required - - - - - - -	12	56	Log. 0.2687

EXAMPLE II.

Let the change of the Sun's right ascension be 3m. 55s. in 24 hours, what would be the proportional part for 11h. 13m.?

	h.	m.	s.	
Time at Greenwich - - - - - -	11	13	0.0	Log. 0.3303
Variation of ☉'s R A. in 24 hours -		3	55.0	Log. 0.7873
Proportional part required - - -		1	49.8	Log. 1.1176

This table will also be very useful in finding the proportional part of the variation of the Moon's Declination or Right Ascension, in 12 hours.

PROBLEM II.

To find the proportional part of the Moon's variation in Declination, or Right Ascension, during 12 hours, for any given time at Greenwich.

RULE.

To the Logarithm of *twice* the variation, in 12 hours, add the Logarithm of the time at Greenwich, reckoned from the preceding noon, or midnight, the Sum will be the Logarithm of the proportional part required.

EXAMPLE I.

Required the proportional part of the change in the Moon's Declination for 5h. 33m. when the variation in 12 hours is 2° 37′?

Variation in 12 hours 2° 37′ × 2 = - - -	5°	14′	Log. 0.6614
	h.	m.	
Time past noon, or Midnight - - - -	5	33	Log. 0.6359
Proportional part required - - - - - -	1°	12′.6	Log. 1.2973

EXAMPLE II.

When the variation of the Moon's right ascension, in 12 hours, is 6° 23′: required the proportional part for 7h. 43m.

	h.	m.	
Time past Noon or Midnight - - -	7	43	Log. 0.4928
Variation in 12 hours 6° 23′ × 2 =	12°	46′	Log. 0.2741
Proportional part for 7h. 43m. - - -	4	6.2	Log. 0.7669

As the motion of the Moon is seldom uniform during 12 hours, it is necessary, when great accuracy is required, to apply the equation of second difference to the declination, &c. as found by even proportion; this is explained in the Nautical Almanac. However, for most nautical purposes, such as finding the Latitude of the Ship by the meridian altitude of the Moon, or the Moon's altitude by computation, it is generally sufficient to find the Moon's declination, or right ascension, by even proportion.

TABLE XI

Logarithms of the Latitude and Polar Distance.

This table contains the Logarithmic Secants of the Latitude, and the Co Secants of the Polar Distance, 10 being rejected from the index. The degrees of Latitude are always found at the top, and the minutes in the left-hand column, and also those of the Polar Distance, when it exceeds 90°. When the Polar Distance is less than 90°, the degrees are always found at the bottom, and the minutes in the right-hand column.

Note.—In this, and in all the other Tables, where the quantities at the top and bottom are different, the numbers for the minutes, &c. in the *left-hand* column belong to the quantities at the top, and those in the *right-hand* column to the degrees, &c. at the bottom.

TABLE XII.

Logarithms of the Half Sum, and Difference.

This table contains the Logarithmic Co-Sines of the Half Sums, and the Log. Sines of the Differences, the index of each being diminished by 5. The Degrees of the Half Sum are always found at the top, and those of the Difference at the bottom.

TABLE XIII.

Logarithms of the Apparent Time or Horary Angle.

The Logarithms in this table are twice the Logarithmic Sines of half their respective Horary Angles, less 10 in the index. When the time is inferred from the altitude of the Sun, the apparent astronomical time is found in this Table, the hours at the top being used when the Sun is observed *west* of the Meridian, and those at the bottom when the observation has been made *east* of the Meridian. The Logarithms are given for every tenth second of time, as far as 9 hours from the Meridian, and by the proportional parts in each page the odd seconds may be very readily found by inspection.

EXAMPLES.

I. What is the apparent time answering to the Logarithm 9.46381, the Sun having been observed west of the Meridian.

Given Logarithm		9.46381
Logarithm of	4h. 21m. 0s. =	9.46340
This difference gives nearest	8	41 Diff.
Apparent time required	4 21 8	

II. The Sun having been observed *east* of the Meridian, required the apparent time when the Logarithm is 9.32246?

Given Logarithm		9.32246
Logarithm of	20h. 21m. 40s. =	9.32272
This difference gives nearest	4	26 Diff.
Apparent time required	20 21 44	

When the Sun is observed *west* of the meridian, the given Logarithm will be *greater* than the Logarithm in the table, answering to the next less tenth second of time; but when the observation is made *east* of the meridian, the contrary is the case.

The *Horary Angle* of a Star is to be taken out in the same manner, in every respect, as the apparent time when the Sun is observed, that is, the *horary distance* of the Star, *west* of the meridian, is to be understood as the *Horary Angle* of the Star, therefore when a Star is observed *west* of the meridian, its meridian distance will be less than 12 hours; but if the observation is made when the Star is *east* of the meridian, the horary angle, or distance of the Star reckoned westward from the meridian, is greater than 12 hours, for it is the complement to 24 hours of the Star's horary distance *east* of the meridian.

If very great accuracy be required in the apparent time, the proportional parts will show the tenths of a second in the apparent time. Thus, in the first Example, the difference between the given Logarithm, and the one in the table for the next less tenth second, is 41, but the parts for 8^s are only 39, therefore there is 2 of a remainder; place a cypher to the right of this remainder, which will make it 20; then above this will be found 4^s, which are to be esteemed 4 tenths of a second: hence the apparent time answering to the Logarithm 9.46381 is 4h. 21m. 8^s.4.

TABLE XIV.

Logarithms of the Moon's Horizontal Parallax.

TABLE XV

Logarithms of the Apparent Altitudes.

These tables require no explanation with respect to the manner of using them; but it may be observed, that the Logarithms in Table XIV. are the Proportional Logarithms of the Moon's Horizontal Parallax, each being lessened by 4600. and a Logarithm of any Apparent Altitude is the Log. Co-Secant of that arch, lessened by 9,5400. This was done with the view of having the Logarithms of the Moon's horizontal parallax at each opening of the book, in Table XV., but it was found inconvenient in printing.

TABLE XVI.

Logarithms of the Apparent Distance.

The Logarithms in this table are titled Log. S. and Log. T., the first being the log. sine and the other the log. tangent of any given Apparent Distance, 9 being rejected from the index. When the Apparent Distance is less than 90°, the degrees of distance will be found at the top; when the distance exceeds 90°, the degrees of distance are found at the bottom. In this Table, as far as 53° of distance, the minutes in both the marginal columns are the same, and therefore either may be used; above 53°, the minutes in the left hand column belong to the degrees at the top, and those in the right-hand column to the bottom degrees. For example, when the apparent distance is 35° 26′, the Log. S. is 0.7632, and the Log. T. 0.8522; or for apparent distance 112° 18′; the Log. S is 0.9662, and the Log. T. 1.3871.

TABLE XVII.

Logarithms of the First and Second Corrections.

The degrees and minutes of the *first correction* are always to be taken from the top, and the second from the left-hand column; also when the apparent distance exceeds 90°, the *second correction* is to be taken out in the same manner; but when the distance is less than 90°, the degrees and minutes of the *second correction* must be taken from the bottom, and the seconds from the right-hand marginal column.

EXAMPLE.

I. The first correction answering to the Logarithms 1.5765 is 4° 12′ 16″.

II. When the Logarithm of the first correction is 1.3462, the first correction will be 3° 38′ 23″.

III. When the apparent distance exceeds 90°, the second correction, answering to the Logarithm 2.1031, is 4° 45′ 48″.

IV. The apparent distance being less than 90°, and Logarithm of the second correction 1.7320, the second correction will be 5° 33′ 22″.

Both the first and second corrections are *always* to be *added* to the apparent distance.

TABLE XVIII

Third Correction.

This correction (like the first and second) is *always* to be *added* to the apparent distance; the distance nearest to the given apparent distance is to be found in the Table; then look for the altitude at the top or bottom, which is nearest the given apparent altitude of the Sun or Star, and in a side column for the altitude, which is nearest to the given apparent altitude of the Moon; under the former, and opposite to the latter, will be found the *third* correction. Thus, when the apparent distance is 52°, the Star's apparent altitude 38°, and that of the Moon 20°, the third correction is 1′ 35″; or when the apparent distance is 79° 36′ 20″, the apparent altitude of the Star 25° 30′, and that of the Moon 41° 15′, the third correction is 1′ 48″.

When the given distance and altitudes differ considerably from those in the Table, it will be proper to make a corresponding allowance on the *third correction.*

For example. Let the given apparent distance be 61° 24′, the Star's altitude 36°, and the Moon's 22°; at apparent distance 60°, under 36°, and opposite 22° is 1′ 29″, but at apparent distance 64°, the given altitudes give 1′ 33″, therefore the third correction, for the given apparent distance and altitudes, will be 1′ 30″. The differences in the corrections given in the Table, being in general very small, the third correction may be almost always found at sight for any given distances and altitudes.

The small Tables, which are titled Table P. contain the effect of the Sun's parallax for the respective distances under which they are placed, when the distance between the Sun and Moon is observed; the effect of the Sun's parallax is to be taken from this table, and applied to the third correction before it be added to the apparent Distance.

The seconds found above the line. In the column are to be added to the third correction, and those found below that mark are to be subtracted from the third correction. For example, at Apparent Distance 52°, when the Sun's altitude is 50° and the Moon's 10°, the effect of the Sun's parallax on the distance is 3″, and this being found above the line—it is to be added to the third correction, found in Table XVIII.; hence the third correction will be 4′ 7″ for the distance between the Sun and Moon, or 3″ greater than it would be if the distance were between the Moon and a fixed Star. Again, at the same distance, if the Sun's altitude be 10° and that of the Moon 50°, the effect of Sun's parallax on the distance is 8″, to be subtracted from the third correction, because it is found below the line, therefore the third correction would be 3′ 59″, or 8″ less than if the distance were between the Moon and a Star.

The effect of the Sun's parallax on the distance can never exceed 9″. When the distance is less than 84°, the effect of the Sun's parallax may be either additive or subtractive: but when the distance is greater than 84°, the effect of the Sun's parallax is always subtractive from the apparent distance, or what is the same thing; the third correction is always to be diminished, by the effect of the Sun's parallax, before that correction be added to the apparent distance.

TABLE XIX.

Proportional Logarithms.

The principal use of this Table is to find the apparent time at Greenwich, corresponding to a given true distance between the Moon and the Sun, or a Star; this is exemplified in Problem IV. page 8. The mode of taking out the Proportional Logarithm for any given arch or time, or of finding the time, &c. for any given Logarithm is obvious. Thus the Logarithm for 1° 16′ 38″, or for 1h. 16m. 38s. is the same, *viz.* 0.3709, and the time answering to the Logarithm 1.3416 is 0h. 8m. 12s.; or the arch in degrees, &c. is 0° 8′ 12″.

The index of a Proportional Logarithm, above 0h. 18m. or 0° 18′, is always 0.

TABLE I.

To turn DEGREES into TIME, or, TIME into DEGREES.

Degrees.	Time.	Degrees.	Time.	Degrees.	Time.	Minutes of Degrees.	Time.	Seconds of Degrees.	Time.
	H. M.		H. M.		H. M.		M. S.		S. T.
1	0. 4	61	4. 4	121	8. 4	1	0. 4	1	0. 4
2	0. 8	62	4. 8	122	8. 8	2	0. 8	2	0. 8
3	0.12	63	4.12	123	8.12	3	0.12	3	0.12
4	0.16	64	4.16	124	8.16	4	0.16	4	0.16
5	0.20	65	4.20	125	8.20	5	0.20	5	0.20
6	0.24	66	4.24	126	8.24	6	0.24	6	0.24
7	0.28	67	4.28	127	8.28	7	0.28	7	0.28
8	0.32	68	4.32	128	8.32	8	0.32	8	0.32
9	0.36	69	4.36	129	8.36	9	0.36	9	0.36
10	0.40	70	4.40	130	8.40	10	0.40	10	0.40
11	0.44	71	4.44	131	8.44	11	0.44	11	0.44
12	0.48	72	4.48	132	8.48	12	0.48	12	0.48
13	0.52	73	4.52	133	8.52	13	0.52	13	0.52
14	0.56	74	4.56	134	8.56	14	0.56	14	0.56
15	1. 0	75	5. 0	135	9. 0	15	1. 0	15	1. 0
16	1. 4	76	5. 4	136	9. 4	16	1. 4	16	1. 4
17	1. 8	77	5. 8	137	9. 8	17	1. 8	17	1. 8
18	1.12	78	5.12	138	9.12	18	1.12	18	1.12
19	1.16	79	5.16	139	9.16	19	1.16	19	1.16
20	1.20	80	5.20	140	9.20	20	1.20	20	1.20
21	1.24	81	5.24	141	9.24	21	1.24	21	1.24
22	1.28	82	5.28	142	9.28	22	1.28	22	1.28
23	1.32	83	5.32	143	9.32	23	1.32	23	1.32
24	1.36	84	5.36	144	9.36	24	1.36	24	1.36
25	1.40	85	5.40	145	9.40	25	1.40	25	1.40
26	1.44	86	5.44	146	9.44	26	1.44	26	1.44
27	1.48	87	5.48	147	9.48	27	1.48	27	1.48
28	1.52	88	5.52	148	9.52	28	1.52	28	1.52
29	1.56	89	5.56	149	9.56	29	1.56	29	1.56
30	2. 0	90	6. 0	150	10. 0	30	2. 0	30	2. 0
31	2. 4	91	6. 4	151	10. 4	31	2. 4	31	2. 4
32	2. 8	92	6. 8	152	10. 8	32	2. 8	32	2. 8
33	2.12	93	6.12	153	10.12	33	2.12	33	2.12
34	2.16	94	6.16	154	10.16	34	2.16	34	2.16
35	2.20	95	6.20	155	10.20	35	2.20	35	2.20
36	2.24	96	6.24	156	10.24	36	2.24	36	2.24
37	2.28	97	6.28	157	10.28	37	2.28	37	2.28
38	2.32	98	6.32	158	10.32	38	2.32	38	2.32
39	2.36	99	6.36	159	10.36	39	2.36	39	2.36
40	2.40	100	6.40	160	10.40	40	2.40	40	2.40
41	2.44	101	6.44	161	10.44	41	2.44	41	2.44
42	2 48	102	6.48	162	10.48	42	2.48	42	2.48
43	2 52	103	6.52	163	10.52	43	2.52	43	2.52
44	2 56	104	6.56	164	10.56	44	2.56	44	2.56
45	3. 0	105	7. 0	165	11. 0	45	3. 0	45	3. 0
46	3. 4	106	7. 4	166	11. 4	46	3. 4	46	3. 4
47	3. 8	107	7. 8	167	11. 8	47	3. 8	47	3. 8
48	3.12	108	7.12	168	11.12	48	3.12	48	3.12
49	3.16	109	7.16	169	11.16	49	3.16	49	3.16
50	3.20	110	7.20	170	11.20	50	3.20	50	3.20
51	3.24	111	7.24	171	11.24	51	3.24	51	3.24
52	3.28	112	7.28	172	11.28	52	3.28	52	3.28
53	3.32	113	7.32	173	11.32	53	3.32	53	3.32
54	3.36	114	7.36	174	11.36	54	3.36	54	3.36
55	3.40	115	7.40	175	11 40	55	3.40	55	3.40
56	3.44	116	7.44	176	11.44	56	3.44	56	3.44
57	3.48	117	7.48	177	11.48	57	3.48	57	3.48
58	3.52	118	7.52	178	11.52	58	3.52	58	3.52
59	3.56	119	7.56	179	11.56	59	3.56	59	3.56
60	4. 0	120	8. 0	180	12. 0	60	4. 0	60	4. 0

TABLE II.

Dip of the Horizon.

Height in Feet.	Dip.	Height in Feet.	Dip.	Height in Feet.	Dip.
	′ ″		′ ″		′ ″
1	0.58	28	5.10	125	10.56
2	1.22	30	5.21	130	11. 9
3	1.40	32	5.31	135	11.22
4	1.55	34	5.46	140	11.35
5	2. 9	36	5.50	145	11 47
6	2.22	38	6. 0	150	11.59
7	2.33	40	6.10	155	12.11
8	2.44	42	6.19	160	12.23
9	2.54	44	6.28	165	12.34
10	3. 3	46	6.37	170	12.45
11	3.12	48	6.45	175	12.56
12	3.21	50	6.53	180	13. 7
13	3.29	55	7.11	185	13.18
14	3.37	60	7.29	190	13.29
15	3.45	65	7.47	195	13.40
16	3.53	70	8. 5	200	13.50
17	4. 1	75	8.23	210	14.10
18	4. 8	80	8.40	220	14.30
19	4.15	85	8.57	230	14.50
20	4.22	90	9.14	240	15. 9
21	4 28	95	9.30	250	15.27
22	4.34	100	9.46	260	15.44
23	4.40	105	10. 1	270	16. 0
24	4.46	110	10.16	280	16.16
25	4.52	115	10.30	290	16.31
26	4 58	120	10.43	300	16.46

TABLE III.

Dip of the Horizon—at different distances from the Observer.

Distance of Land in Miles.	HEIGHT OF THE EYE IN FEET.									
	5	10	15	20	25	30	35	40	45	50
	′	′	′	′	′	′	′	′	′	′
0.1	28	56	84	112	140	169	197	225	252	280
0.2	14	28	42	56	70	85	99	113	126	140
0.3	9	19	28	37	47	56	65	75	84	93
0.4	7	14	21	28	35	42	49	56	63	70
0.5	6	11	17	22	28	34	39	45	50	56
0 6	5	9	14	19	23	28	33	37	42	47
0.7	4	8	12	16	20	24	28	32	36	40
0.8	4	7	10	14	17	21	25	28	31	35
0.9	3	6	9	12	15	19	22	25	28	31
1.0	3	6	8	11	14	17	20	23	25	27
1.2	3	5	7	9	12	14	16	19	21	23
1.4	3	4	6	8	10	12	14	16	18	20
1.6	3	4	5	7	9	11	13	14	16	18
1.8	2	3	5	6	8	10	12	13	14	16
2.0	2	3	5	6	7	9	11	12	13	15
2.2	2	3	5	6	7	8	10	11	12	14
2.4	2	3	5	6	7	8	9	11	12	13
2.6	2	3	4	5	6	8	9	10	11	12
2.8	2	3	4	5	6	7	8	9	10	11
3.0	2	3	4	5	6	7	8	8	9	10
3.5	2	3	4	5	6	6	7	8	9	9
4.0	2	3	4	4	5	6	7	7	8	8
4.5	2	3	4	4	5	5	6	6	7	8
5.0	2	3	4	4	5	5	6	6	7	7
6.0	2	3	4	4	5	5	6	6	7	7
7.0	2	3	4	4	5	5	6	6	7	7

TABLE IV.

Moon's Augmentation.

☽'s App. Alt.	☽'s SEMIDIAMETER BY THE NAUTICAL ALMANAC.						
	′ ″ 14.40	′ ″ 15. 0	′ ″ 15.20	′ ″ 15.40	′ ″ 16. 0	′ ″ 16.20	′ ″ 16.40
°	″	″	″	″	″	″	″
0	0	0	0	0	0	0	0
3	1	1	1	1	1	1	1
6	2	2	2	2	2	2	2
9	2	2	3	3	3	3	3
12	3	3	3	3	4	4	4
15	4	4	4	4	4	5	5
18	4	5	5	5	5	5	6
21	5	5	6	6	6	6	7
24	6	6	6	7	7	7	7
27	6	7	7	7	8	8	8
30	7	7	8	8	8	9	9
33	8	8	8	8	9	9	10
36	8	8	9	9	10	10	11
39	9	9	10	10	11	11	11
42	9	10	10	11	11	12	12
45	10	10	11	11	12	12	13
48	10	11	11	12	12	13	13
51	11	12	12	12	13	13	14
54	11	12	12	13	13	14	14
57	12	13	13	13	14	14	15
60	12	13	13	14	14	15	16
65	13	14	14	15	15	16	16
70	13	14	14	15	16	16	17
75	14	14	15	15	16	16	17
80	14	14	15	16	16	17	18
90	14	15	15	16	17	17	18

TABLE V.

Contraction of Semidiameter of ☉ or ☽.

Apparent Altitude.	ANGLE WITH THE HORIZON.											
	° 0	° 12	° 24	° 36	° 48	° 54	° 60	° 66	° 72	° 78	° 84	° 90
° ′	″	″	″	″	″	″	″	″	″	″	″	″
5. 0	0	1	4	9	14	16	19	21	23	24	25	25
5.20	0	1	4	8	12	14	17	19	21	22	23	23
5.40	0	1	3	8	11	13	15	17	19	20	21	21
6. 0	0	1	3	7	10	12	14	16	17	18	19	19
6.20	0	1	3	6	9	11	13	14	15	16	17	17
6.40	0	1	2	5	8	10	12	13	14	15	15	15
7. 0	0	1	2	5	8	9	11	12	13	14	14	14
7.20	0	1	2	5	7	8	10	11	12	13	13	13
7.40	0	0	2	4	6	8	9	10	11	12	12	12
8. 0	0	0	2	4	6	7	8	9	10	11	11	11
8.30	0	0	2	4	5	6	7	8	9	10	10	10
9. 0	0	0	1	3	5	6	7	7	8	9	9	9
10. 0	0	0	1	3	4	5	6	6	7	7	8	8
11. 0	0	0	1	3	4	5	5	5	6	6	6	6
12. 0	0	0	1	2	3	4	4	5	5	5	5	5
13. 0	0	0	1	2	3	4	4	4	4	4	4	4
14. 0	0	0	1	1	2	3	3	3	4	4	4	4
15. 0	0	0	1	1	2	2	3	3	3	3	3	3
16. 0	0	0	1	1	2	2	2	3	3	3	3	3
18. 0	0	0	0	1	1	1	2	2	2	2	3	3
20. 0	0	0	0	1	1	1	2	2	2	2	2	2
30. 0	0	0	0	0	1	1	1	1	1	1	1	1
40. 0	0	0	0	0	0	0	0	0	1	1	1	1
50. 0	0	0	0	0	0	0	0	0	0	0	0	0
70. 0	0	0	0	0	0	0	0	0	0	0	0	0
90. 0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE VI.

CORRECTIONS of the APPARENT ALTITUDES of the SUN and STARS.

Alt.	⊙'s Corr.	*'s Corr.	Diff. to 10′	Alt.	⊙'s Corr.	*'s Corr.	Alt.	⊙'s Corr.	*'s Corr.	Alt.	⊙'s Corr.	*'s Corr.	Alt.	⊙'s Corr.	*'s Corr.
° ′	′ ″	′ ″	″	° ′	′ ″	′ ″	° ′	′ ″	′ ″	° ′	′ ″	′ ″	° ′	′ ″	′ ″
0. 0	32.51	33. 0	98	10. 0	5. 6	5.15	20. 0	2.28	2.36	30. 0	1.31	1.39	50. 0	0.42	0.48
10	31.13	31.22	92	10	5. 1	5.10	10	2.27	2.35	20	1.29	1.37	30	.42	.47
20	29.41	29.50	87	20	4.56	5. 5	20	2.25	2.33	40	1.28	1.36	51. 0	.41	.46
30	28.14	28.23	83	30	4.51	5. 0	30	2.24	2.32	31. 0	1.27	1.35	30	.40	.46
40	26.51	27. 0	78	40	4.47	4.56	40	2.22	2.30	20	1.26	1.33	52. 0	.39	.45
50	25.33	25.42	73	50	4.42	4.51	50	2.21	2.29	40	1.25	1.32	30	.39	.44
1. 0	24.20	24.29	69	11. 0	4.38	4.47	21. 0	2.19	2.27	32. 0	1.24	1.31	53. 0	.38	.43
10	23.11	23.20	65	10	4.34	4.43	10	2.18	2.26	20	1.23	1.30	30	.37	.42
20	22. 6	22.15	61	20	4.30	4.39	20	2.17	2.25	40	1.22	1.29	54. 0	.36	.41
30	21. 5	21.14	56	30	4.26	4.35	30	2.15	2.23	33. 0	1.21	1.28	30	.36	.41
40	20. 9	20.18	53	40	4.22	4.31	40	2.14	2.22	20	1.19	1.26	55. 0	.35	.40
50	19.16	19.25	50	50	4.18	4.27	50	2.13	2.21	40	1.18	1.25	30	.34	.39
2. 0	18.26	18.35	47	12. 0	4.14	4.23	22. 0	2.12	2.20	34. 0	1.17	1.24	56. 0	.33	.38
10	17.39	17.48	44	10	4.11	4.20	10	2.11	2.19	20	1.16	1.23	30	.33	.38
20	16.55	17. 4	41	20	4. 7	4.16	20	2.10	2.18	40	1.15	1.22	57. 0	.32	.37
30	16.14	16.23	38	30	4. 4	4.13	30	2. 9	2.17	35. 0	1.14	1.21	30	.32	.37
40	15.36	15.45	36	40	4. 1	4.10	40	2. 8	2.16	20	1.13	1.20	58. 0	.31	.36
50	15. 0	15. 9	34	50	3.57	4. 6	50	2. 7	2.15	40	1.12	1.19	30	.31	.35
3. 0	14.27	14.36	32	13. 0	3.54	4. 3	23. 0	2. 6	2.14	36. 0	1.11	1.18	59. 0	.30	.34
10	13.55	14. 4	30	10	3.51	4. 0	10	2. 5	2.13	20	1.10	1.17	30	.30	.34
20	13.25	13.34	28	20	3.48	3.57	20	2. 4	2.12	40	1.10	1.17	60. 0	.29	.33
30	12.57	13. 6	27	30	3.45	3.54	30	2. 3	2.11	37. 0	1. 9	1.16	30	.28	.33
40	12.30	12.39	25	40	3.42	3.51	40	2. 2	2.10	20	1. 8	1.15	61. 0	.27	.32
50	12. 5	12.14	24	50	3.39	3.48	50	2. 1	2. 9	40	1. 7	1.14	30	.27	.31
4. 0	11.41	11.50	22	14. 0	3.37	3.46	24. 0	2. 0	2. 8	38. 0	1. 6	1.13	62. 0	.26	.30
10	11.19	11.28	21	10	3.34	3.43	10	1.59	2. 7	20	1. 5	1.12	30	.26	.30
20	10.58	11. 7	20	20	3.31	3.40	20	1.58	2. 6	40	1. 4	1.11	63. 0	.25	.29
30	10.38	10.47	19	30	3.29	3.38	30	1.57	2. 5	39. 0	1. 3	1.10	30	.25	.29
40	10.19	10.28	18	40	3.26	3.35	40	1.56	2. 4	20	1. 2	1. 9	64. 0	.24	.28
50	10. 1	10.10	17	50	3.24	3.33	50	1.55	2. 3	40	1. 1	1. 8	30	.24	.28
5. 0	9.44	9.53	16	15. 0	3.21	3.30	25. 0	1.54	2. 2	40. 0	1. 1	1. 8	65. 0	.23	.27
10	9.28	9.37	15	10	3.19	3.28	10	1.53	2. 1	20	1. 0	1. 7	30	.23	.26
20	9.13	9.22	15	20	3.17	3.26	20	1.52	2. 0	40	1. 0	1. 6	66. 0	.22	.25
30	8.58	9. 7	14	30	3.15	3.24	30	1.51	1.59	41. 0	.59	1. 5	30	.22	.25
40	8.44	8.53	13	40	3.12	3.21	40	1.50	1.58	20	.58	1. 4	67. 0	.21	.24
50	8.31	8.40	13	50	3.10	3.19	50	1.49	1.57	40	.57	1. 3	30	.21	.24
6. 0	8.18	8.27	12	16. 0	3. 8	3.17	26. 0	1.48	1.56	42. 0	.57	1. 3	68. 0	.20	.23
10	8. 6	8.15	12	10	3. 6	3.15	10	1.47	1.55	20	.56	1. 2	30	.20	.23
20	7.54	8. 3	11	20	3. 4	3.13	20	1.46	1.54	40	.56	1. 1	69. 0	.19	.22
30	7.43	7.52	11	30	3. 2	3.11	30	1.45	1.53	43. 0	.55	1. 1	70. 0	.18	.21
40	7.32	7.41	10	40	3. 0	3. 9	40	1.45	1.53	20	.55	1. 0	71. 0	.17	.20
50	7.22	7.31	10	50	2.58	3. 7	50	1.44	1.52	40	.54	1. 0	72. 0	.16	.19
7. 0	7.12	7.21	9	17. 0	2.56	3. 5	27. 0	1.43	1.51	44. 0	.53	.59	73. 0	.15	.17
10	7. 3	7.12	9	10	2.54	3. 3	10	1.42	1.50	20	.53	.58	74. 0	.14	.16
20	6.54	7. 3	9	20	2.52	3. 1	20	1.42	1.50	40	.52	.58	75. 0	.13	.15
30	6.45	6.54	8	30	2.50	2.59	30	1.41	1.49	45. 0	.51	.57	76. 0	.12	.14
40	6.37	6.46	8	40	2.49	2.58	40	1.41	1.49	20	.51	.57	77. 0	.11	.13
50	6.29	6.38	8	50	2.47	2.56	50	1.40	1.48	40	.50	.56	78. 0	.10	.12
8. 0	6.21	6.30	8	18. 0	2.45	2.54	28. 0	1.39	1.47	46. 0	.49	.55	79. 0	. 9	.11
10	6.13	6.22	7	10	2.43	2.52	10	1.38	1.46	20	.49	.55	80. 0	. 8	.10
20	6. 6	6.15	7	20	2.42	2.51	20	1.38	1.46	40	.48	.54	81. 0	. 8	. 9
30	5.59	6. 8	7	30	2.40	2.49	30	1.37	1.45	47. 0	.47	.53	82. 0	. 7	. 8
40	5.52	6. 1	6	40	2.38	2.47	40	1.37	1.45	20	.47	.53	83. 0	. 6	. 7
50	5.46	5.55	6	50	2.37	2.46	50	1.36	1.44	40	.46	.52	84. 0	. 5	. 6
9. 0	5.40	5.49	6	19. 0	2.36	2.44	29. 0	1.35	1.43	48. 0	.45	.51	85. 0	. 4	. 5
10	5.34	5.43	6	10	2.35	2.43	10	1.34	1.42	20	.45	.51	86. 0	. 3	. 4
20	5.28	5.37	6	20	2.33	2.41	20	1.34	1.42	40	.44	.50	87. 0	. 3	. 3
30	5.22	5.31	5	30	2.32	2.40	30	1.33	1.41	49. 0	.44	.50	88. 0	. 2	. 2
40	5.17	5.26	5	40	2.31	2.39	40	1.32	1.40	20	.43	.49	89. 0	. 1	. 1
50	5.12	5.21		50	2.29	2.37	50	1.32	1.40	40	.43	.49	90. 0	. 0	. 0

TABLE VII.

To Correct the Mean Refraction.

App. Alt.	HEIGHT OF THE THERMOMETER.																	App. Alt.
	° 20	° 24	° 28	° 32	° 36	° 40	° 44	° 48	° 50	° 52	° 56	° 60	° 64	° 68	° 72	° 76	° 80	
°	′+″	′+″	′+″	′+″	′+″	′+″	′+″	′+″	′ ″	′–″	′–″	′–″	′–″	′–″	′–″	′–″	′–″	°
2	1 31	1 18	1. 5	53	41	29	17	6	0	5	16	27	37	48	58	1. 8	1.18	2
3	1 11	1 1	51	41	32	22	13	4	0	4	13	21	30	38	46	54	1. 1	3
4	58	49	41	33	26	18	11	4	0	4	11	17	24	31	37	44	50	4
5	48	41	35	28	22	16	9	3	0	3	9	14	20	26	31	36	41	5
6	41	35	30	24	19	14	8	3	0	2	7	12	17	22	26	31	35	6
7	36	31	26	21	17	12	7	2	0	2	6	10	15	19	23	27	31	7
8	32	27	23	19	15	10	6	2	0	2	5	9	13	16	20	24	27	8
9	29	24	20	17	13	9	5	2	0	2	5	8	11	14	18	21	24	9
10	26	22	18	15	12	8	5	2	0	1	4	7	10	13	16	19	22	10
11	23	20	17	14	11	8	5	2	0	1	4	7	9	12	15	18	20	11
12	21	18	15	13	10	7	4	1	0	1	4	6	8	11	13	16	18	12
14	18	16	13	11	8	6	4	1	0	1	3	5	7	9	11	14	16	14
16	16	14	12	9	7	5	3	1	0	1	3	5	6	8	10	12	14	16
18	14	12	10	8	6	5	3	1	0	1	2	4	6	7	9	10	12	18
20	13	11	9	7	6	4	2	1	0	1	2	4	5	6	8	9	11	20
22	11	10	8	7	5	4	2	1	0	1	2	3	5	6	7	8	10	22
26	9	8	7	6	4	3	2	1	0	1	2	3	4	5	6	7	8	26
30	8	7	6	5	4	3	2	1	0	0	1	2	3	4	5	6	7	30
35	7	6	5	4	3	2	1	0	0	0	1	2	3	3	4	5	6	35
40	6	5	4	3	3	2	1	0	0	0	1	2	2	3	3	4	5	40
50	4	3	3	2	2	1	1	0	0	0	1	1	2	2	2	3	3	50
60	3	2	2	2	1	1	1	0	0	0	0	1	1	1	2	2	2	60
70	2	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	70
80	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	80
90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90
App. Alt.				– 28.26	– 28.56	– 28.85	– 29.15	– 29.45	29.60	+ 29.75	+ 30.05	+ 30.35	+ 30.64	+ 30.93				App. Alt.
	HEIGHT OF THE BAROMETER.																	

TABLE VIII.

Correction of the Moon's Semidiameter, or Horizontal Parallax, for any given Time between Noon and Midnight, or of the Sun's Declination for a given Time from the preceding Noon

Time after Noon or Midnight.	VARIATION OF THE ☽'s SEMIDIAMETER OR HORIZONTAL PARALLAX IN 12 HOURS.																											Time past Noon.
	″ 1	″ 2	″ 3	″ 4	″ 5	″ 6	″ 7	″ 8	″ 9	″ 10	″ 11	″ 12	″ 13	″ 14	″ 15	″ 16	″ 17	″ 18	″ 19	″ 20	″ 21	″ 22	″ 23	″ 24	″ 25	″ 26	″ 27	″ 28	
h. m.																													h.
0 30	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1 0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2
1 30	0	0	0	0	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3
2 0	0	0	0	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4	5	4
2 30	0	0	1	1	1	1	1	2	2	2	2	2	3	3	3	3	4	4	4	4	4	5	5	5	5	5	5	6	5
3 0	0	0	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5	5	5	5	6	6	6	6	7	7	6
3 30	0	1	1	1	1	2	2	2	3	3	3	3	4	4	4	5	5	5	6	6	6	6	7	7	7	8	8	8	7
4 0	0	1	1	1	2	2	2	3	3	3	4	4	4	5	5	5	6	6	6	7	7	7	8	8	8	9	9	9	8
4 30	0	1	1	1	2	2	3	3	3	4	4	4	5	5	6	6	6	7	7	7	8	8	9	9	9	10	10	10	9
5 0	0	1	1	2	2	2	3	3	4	4	5	5	5	6	6	7	7	7	8	8	9	9	10	10	10	11	11	12	10
5 30	0	1	1	2	2	3	3	4	4	5	5	5	6	6	7	7	8	8	9	9	10	10	11	11	11	12	12	13	11
6 0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12	13	13	14	12
6 30	1	1	2	2	3	3	4	4	5	5	6	6	7	8	8	9	9	10	10	11	11	12	12	13	14	14	15	15	13
7 0	1	1	2	2	3	3	4	5	5	6	6	7	8	8	9	9	10	10	11	12	12	13	13	14	15	15	16	16	14
7 30	1	1	2	2	3	4	4	5	6	6	7	7	8	9	9	10	11	11	12	12	13	14	14	15	16	16	17	17	15
8 0	1	1	2	3	3	4	5	5	6	7	7	8	9	9	10	11	11	12	13	13	14	15	15	16	17	17	18	19	16
8 30	1	1	2	3	4	4	5	6	6	7	8	8	9	10	11	11	12	13	13	14	15	16	16	17	18	18	19	20	17
9 0	1	1	2	3	4	4	5	6	7	7	8	9	10	10	11	12	13	13	14	15	16	16	17	18	19	19	20	21	18
9 30	1	2	2	3	4	5	6	6	7	8	9	9	10	11	12	13	13	14	15	16	17	17	18	19	20	21	21	22	19
10 0	1	2	2	3	4	5	6	7	7	8	9	10	11	12	12	13	14	15	16	17	17	18	19	20	21	22	22	23	20
10 30	1	2	3	3	4	5	6	7	8	9	10	10	11	12	13	14	15	16	17	17	18	19	20	21	22	23	24	24	21
11 0	1	2	3	4	5	5	6	7	8	9	10	11	12	13	14	15	16	16	17	18	19	20	21	22	23	24	25	26	22
11 30	1	2	3	4	5	6	7	8	9	10	11	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	23
12 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	24
Time after Noon or Midnight.	′ 1	′ 2	′ 3	′ 4	′ 5	′ 6	′ 7	′ 8	′ 9	′ 10	′ 11	′ 12	′ 13	′ 14	′ 15	′ 16	′ 17	′ 18	′ 19	′ 20	′ 21	′ 22	′ 23	′ 24	′ 25	′ 26	′ 27	′ 28	Time past Noon.
	VARIATION OF THE ⊙'s DECLINATION IN 24 HOURS.																												

TABLE IX.

ALTITUDES by which the APPARENT TIME may be found with the greatest Accuracy.

Lat.	DECLINATION OF THE OBJECT, OF THE SAME NAME AS THE LATITUDE.																									Lat.
	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	40°	42°	44°	46°	48°	50°	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	30	14	10	7	6	5	4	4	3	3	3	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1
2	90	30	19	15	12	10	8	7	6	6	5	5	5	4	4	4	4	3	3	3	3	3	3	3	3	2
3	42	49	30	22	18	15	12	11	10	9	8	7	7	6	6	6	5	5	5	5	4	4	4	4	4	3
4	30	90	42	30	24	20	17	15	13	12	11	10	9	9	8	8	7	7	7	6	6	6	6	5	5	4
5	24	53	56	39	30	25	21	18	16	15	13	12	11	11	10	9	9	9	8	8	7	7	7	7	7	5
6	20	42	90	49	37	30	26	22	20	18	16	15	14	13	12	11	11	10	10	9	9	9	8	8	8	6
7	17	35	59	61	45	36	30	26	23	21	19	17	16	15	14	13	13	12	11	11	11	10	10	9	9	7
8	15	30	49	90	53	42	35	30	27	24	22	20	19	17	16	15	14	14	13	13	12	12	11	11	10	8
9	12	26	42	63	64	49	40	34	30	27	25	23	21	20	18	17	16	15	15	14	14	13	13	12	12	9
10	11	24	37	53	90	57	46	39	34	30	28	25	23	22	20	19	18	17	16	16	15	14	14	14	13	10
11	10	22	33	47	66	67	52	44	38	34	31	28	26	24	22	21	20	19	18	17	17	16	15	15	14	11
12	10	20	30	42	59	90	59	49	42	37	34	31	28	26	25	23	22	21	20	19	18	17	17	16	16	12
13	9	18	28	38	51	68	68	55	47	41	37	34	31	29	27	25	24	23	21	20	20	19	18	18	17	13
14	8	17	26	35	46	59	90	61	52	45	40	37	33	31	29	27	26	24	23	22	21	20	20	19	18	14
15	8	16	24	33	42	53	69	70	57	49	44	40	36	34	31	29	28	26	25	24	23	22	21	20	20	15
16	7	15	22	30	39	49	61	90	63	54	47	43	39	36	33	31	30	28	27	25	24	23	23	22	21	16
17	7	14	21	28	36	45	56	71	71	59	51	46	42	39	36	33	32	30	28	27	26	25	24	23	22	17
18	6	13	20	27	34	42	52	63	90	65	56	49	45	41	38	36	34	32	30	29	28	26	25	25	24	18
19	6	12	19	25	32	40	48	58	72	72	60	53	48	44	41	38	36	34	32	30	29	28	27	26	25	19
20	6	12	18	24	31	37	45	50	65	90	66	57	51	47	43	40	38	36	34	32	31	30	28	27	27	20
21	6	11	17	23	29	35	42	59	60	73	73	62	55	50	46	43	40	38	36	34	32	31	30	29	28	21
22	5	11	16	22	28	34	40	47	56	66	90	67	59	53	49	45	42	40	38	36	34	33	31	30	29	22
23	5	10	16	21	26	32	38	45	52	61	73	74	63	57	51	48	44	42	39	37	36	34	33	32	31	23
24	5	10	15	20	25	31	36	43	49	57	67	90	68	60	54	50	47	44	41	39	38	36	34	33	32	24
25	5	9	14	19	24	29	35	41	47	54	62	74	75	64	58	53	49	46	43	41	39	38	36	35	34	25
26	5	9	14	19	23	28	33	39	45	51	59	68	90	69	61	56	52	48	45	43	41	39	38	36	35	26
27	4	9	13	18	22	27	32	37	43	49	56	64	75	76	65	59	54	51	48	45	43	41	39	38	36	27
28	4	9	13	17	22	26	31	36	41	47	53	60	69	90	70	62	57	53	50	47	45	43	41	39	38	28
29	4	8	12	17	21	25	30	35	40	45	51	57	65	76	76	66	60	56	52	49	47	44	42	41	39	29
30	4	8	12	16	20	25	29	34	38	43	49	54	61	70	90	71	64	58	54	51	49	46	44	42	41	30
31	4	8	12	16	20	24	28	33	37	42	47	52	58	66	76	77	67	61	57	53	51	48	46	44	42	31
32	4	8	11	15	19	23	27	32	36	40	45	50	56	62	71	90	71	64	60	56	53	50	48	46	44	32
33	4	7	11	15	19	22	26	31	35	39	43	48	54	60	67	77	77	68	62	58	55	52	49	47	45	33
34	4	7	11	14	18	22	26	30	34	38	42	47	52	57	63	72	90	72	65	61	57	54	51	49	47	34
35	3	7	10	14	18	21	25	29	33	37	41	45	50	55	61	68	77	78	69	63	59	56	53	51	49	35
36	3	7	10	14	17	21	24	28	32	36	40	44	48	53	58	65	72	90	73	66	62	58	55	52	50	36
37	3	7	10	13	17	20	24	27	31	35	39	43	47	51	56	62	68	78	78	70	64	60	57	54	52	37
38	3	7	10	13	16	20	23	27	30	34	38	41	45	50	54	59	65	73	90	74	66	62	59	56	54	38
39	3	6	10	13	16	19	33	26	29	33	37	40	44	48	53	57	62	69	78	78	70	65	61	58	55	39
40	3	6	9	12	16	19	22	25	29	32	36	39	43	47	51	55	60	66	73	90	74	68	63	60	57	40
42	3	6	9	12	15	18	21	24	28	31	34	37	41	45	48	52	57	62	67	74	90	75	69	64	61	42
44	3	6	9	12	15	17	20	23	26	29	33	36	39	43	46	50	54	58	62	68	74	90	75	69	65	44
46	3	6	8	11	14	17	20	23	25	28	31	34	38	41	44	48	51	55	59	63	68	75	90	76	70	46
48	3	5	8	11	14	16	19	22	24	27	30	33	36	39	42	46	49	52	56	60	64	69	76	90	76	48
50	3	5	8	10	13	16	18	21	24	27	29	32	35	38	41	44	47	50	54	57	61	65	70	76	90	50
52	3	5	8	10	13	15	18	20	23	26	28	31	34	37	39	42	45	48	51	55	58	62	66	70	77	52
54	2	5	7	10	12	15	17	20	22	25	28	30	33	36	38	41	43	46	49	53	56	59	63	67	71	54
56	2	5	7	10	12	15	17	19	22	24	27	29	32	35	37	40	42	45	48	51	54	57	60	64	68	56
58	2	5	7	9	12	14	17	19	21	24	26	29	31	34	36	39	41	44	47	49	52	55	58	61	65	58
60	2	5	7	9	12	14	16	19	21	23	26	28	30	33	35	38	40	43	45	48	51	53	56	59	62	60
62	2	5	7	9	11	14	16	18	20	23	25	27	30	32	35	37	39	42	44	47	49	52	54	57	60	62
64	2	4	7	9	11	13	16	18	20	22	25	27	29	31	34	36	39	41	43	46	48	51	53	56	58	64
66	2	4	7	9	11	13	15	18	20	22	24	26	29	31	33	35	38	40	42	45	47	49	52	55	57	66
68	2	4	6	9	11	13	15	17	19	22	24	26	28	30	33	35	37	39	42	44	46	48	51	53	56	68
70	2	4	6	9	11	13	15	17	19	21	23	26	28	30	32	34	36	39	41	43	45	48	50	52	55	70
72	2	4	6	8	11	13	15	17	19	21	23	25	28	30	32	34	35	38	40	42	44	47	49	51	54	72
74	2	4	6	8	10	12	15	17	19	21	23	25	27	29	31	33	35	38	40	42	44	46	48	50	53	74
76	2	4	6	8	10	12	14	16	19	21	23	25	27	29	31	33	35	37	39	42	43	46	48	50	52	76
80	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	35	37	39	41	43	45	47	49	51	80
	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	40°	42°	44°	46°	48°	50°	

TABLE X.

LOGARITHMS for finding the CORRECTION of the SUN'S DECLINATION, &c.

Min. or Sec.	HOURS, DEGREES, OR MINUTES.												Min. or Sec.
	0	1	2	3	4	5	6	7	8	9	10	11	
0		1.3802	1.0792	0.9031	0.7781	0.6812	0.6021	0.5351	0.4771	0.4260	0.3802	0.3388	0
1	3.1584	1.3730	0756	9007	7763	6798	6009	5341	4762	4252	3794	3382	1
2	2.8573	1.3660	0728	8983	7745	6784	5997	5330	4753	4244	3787	3375	2
3	2.6812	1.3591	0685	8959	7728	6769	5985	5320	4744	4236	3780	3368	3
4	2.5563	1.3522	0649	8935	7710	6755	5973	5310	4735	4228	3773	3362	4
5	2.4604	1.3454	1.0614	0.8912	0.6692	0.6741	0.5961	0.5300	0.4726	0.4220	0.3766	0.3355	5
6	2.3802	1.3388	0580	8888	6674	6726	5949	5289	4717	4212	3759	3349	6
7	2.3133	1.3323	0546	8865	6657	6712	5937	5279	4708	4204	3752	3342	7
8	2.2554	1.3259	0512	8842	6639	6698	5925	5269	4699	4196	3745	3336	8
9	2.2041	1.3196	0478	8819	6622	6684	5913	5259	4690	4188	3737	3329	9
10	2.1584	1.3133	1.0444	0.8796	0.7604	0.6670	0.5902	0.5249	0.4682	0.4180	0.3730	0.3323	10
11	2.1170	1.3071	0411	8773	7587	6656	5890	5239	4673	4172	3723	3316	11
12	2.0792	1.3010	0378	8751	7570	6642	5878	5229	4664	4164	3716	3310	12
13	2.0444	1.2950	0345	8728	7552	6628	5866	5219	4655	4156	3709	3303	13
14	2.0122	1.2891	0313	8706	7535	6614	5855	5209	4646	4148	3702	3297	14
15	1.9823	1.2833	1.0280	0.8683	0.7518	0.6600	0.5843	0.5199	0.4638	0.4141	0.3695	0.3291	15
16	1.9542	1.2775	0248	8661	7501	6587	5832	5189	4629	4133	3688	3284	16
17	1.9280	1.2719	0216	8639	7484	6573	5821	5179	4620	4125	3681	3278	17
18	1.9031	1.2663	0185	8617	7467	6559	5809	5169	4611	4117	3674	3271	18
19	1.8796	1.2607	0153	8595	7451	6546	5797	5159	4603	4109	3667	3265	19
20	1.8573	1.2553	1.0122	0.8573	0.7434	0.6532	0.5786	0.5149	0.4594	0.4102	0.3660	0.3258	20
21	1.8361	1.2498	0091	8552	7417	6518	5774	5139	4585	4094	3653	3252	21
22	1.8159	1.2445	0061	8530	7401	6505	5763	5129	4577	4086	3646	3246	22
23	1.7966	1.2393	0030	8509	7384	6492	5752	5120	4568	4079	3639	3239	23
24	1.7782	1.2340	1.0000	8487	7368	6478	5740	5110	4559	4071	3632	3233	24
25	1.7604	1.2289	0.9970	0.8466	0.7351	0.6465	0.5729	0.5100	0.4551	0.4063	0.3625	0.3227	25
26	1.7434	1.2239	9940	8445	7335	6451	5718	5090	4542	4055	3618	3220	26
27	1.7270	1.2188	9910	8124	7318	6438	5706	5081	4534	4048	3611	3214	27
28	1.7112	1.2139	9881	8403	7302	6425	5695	5071	4525	4040	3604	3208	28
29	1.6960	1.2090	9852	8382	7286	6412	5684	5061	4516	4032	3597	3201	29
30	1.6812	1.2041	0.9823	0.8361	0.7270	0.6398	0.5673	0.5051	0.4508	0.4025	0.3590	0.3195	30
31	1.6670	1.1993	9794	8341	7254	6385	5662	5042	4499	4017	3583	3189	31
32	1.6532	1.1946	9765	8320	7238	6372	5651	5032	4491	4010	3576	3183	32
33	1.6398	1.1899	9737	8300	7222	6359	5640	5023	4482	4002	3570	3176	33
34	1.6269	1.1852	9708	8279	7206	6346	5629	5013	4474	3994	3563	3170	34
35	1.6143	1.1806	0.9680	0.8259	0.7190	0.6333	0.5618	0.5003	0.4466	0.3987	0.3556	0.3164	35
36	1.6021	1.1761	9652	8239	7174	6320	5607	4994	4457	3979	3549	3157	36
37	1.5902	1.1716	9625	8219	7159	6307	5596	4984	4449	3972	3542	3151	37
38	1.5786	1.1671	9597	8199	7143	6294	5585	4975	4440	3964	3535	3145	38
39	1.5673	1.1627	9570	8179	7128	6282	5574	4965	4432	3957	3529	3139	39
40	1.5563	1.1584	0.9542	0.8159	0.7112	0.6269	0.5563	0.4956	0.4424	0.3949	0.3522	0.3133	40
41	1.5456	1.1541	9515	8140	7097	6256	5552	4947	4415	3942	3515	3126	41
42	1.5351	1.1498	9488	8120	7081	6243	5541	4937	4407	3934	3508	3120	42
43	1.5249	1.1455	9461	8101	7066	6231	5531	4928	4399	3927	3501	3114	43
44	1.5149	1.1413	9434	8081	7050	6218	5520	4918	4390	3919	3495	3108	44
45	1.5051	1.1372	0.9408	0.8062	0.7035	0.6205	0.5509	0.4909	0.4382	0.3912	0.3488	0.3102	45
46	1.4956	1.1331	9382	8043	7020	6193	5498	4900	4374	3905	3481	3096	46
47	1.4863	1.1290	9356	8023	7005	6180	5488	4896	4365	3897	3475	3089	47
48	1.4771	1.1249	9330	8004	6990	6168	5477	4881	4357	3890	3468	3083	48
49	1.4682	1.1209	9305	7985	6975	6155	5466	4872	4349	3882	3461	3077	49
50	1.4594	1.1170	0.9279	0.7966	0.6960	0.6143	0.5455	0.4863	0.4341	0.3875	0.3454	0.3071	50
51	1.4508	1.1130	9254	7947	6945	6131	5415	4853	4333	3868	3448	3065	51
52	1.4424	1.1091	9228	7929	6930	6118	5435	4844	4324	3860	3441	3059	52
53	1.4342	1.1053	9203	7910	6915	6106	5424	4835	4316	3853	3434	3053	53
54	1.4260	1.1015	9178	7891	6900	6094	5414	4826	4308	3846	3428	3047	54
55	1.4180	1.0977	0.9153	0.7873	0.6885	0.6081	0.5403	0.4817	0.4300	0.3838	0.3421	0.3041	55
56	1.4102	1.0940	9128	7854	6871	6069	5393	4808	4292	3831	3415	3034	56
57	1.4025	1.0902	9104	7836	6856	6057	5382	4798	4284	3824	3408	3028	57
58	1.3939	1.0865	9079	7818	6841	6045	5372	4789	4276	3817	3401	3022	58
59	1.3875	1.0828	9055	7800	6827	6033	5361	4780	4268	3809	3395	3016	59
	0	1	2	3	4	5	6	7	8	9	10	11	

TABLE X

LOGARITHMS for finding the CORRECTION of the SUN'S DECLINATION, &c.

Min. or Sec.	HOURS, DEGREES, OR MINUTES.												Min. or Sec.
	12	13	14	15	16	17	18	19	20	21	22	23	
0	0.3010	0.2663	0.2341	0.2041	0.1761	0.1498	0.1249	0.1015	0.0792	0.0580	0.0378	0.0185	0
1	3004	2657	2336	2036	1756	1493	1245	1011	0788	0576	0375	0182	1
2	2998	2652	2330	2031	1752	1489	1241	1007	0785	0573	0371	0179	2
3	2992	2646	2325	2027	1747	1485	1237	1003	0781	0570	0368	0175	3
4	2986	2640	2320	2022	1743	1481	1233	0999	0777	0566	0365	0172	4
5	0.2980	0.2635	0.2315	0.2017	0.1738	0.1476	0.1229	0.0996	0.0774	0.0563	0.0361	0.0169	5
6	2974	2629	2310	2012	1734	1472	1225	0992	0770	0559	0358	0166	6
7	2968	2624	2305	2008	1729	1468	1221	0988	0767	0556	0355	0163	7
8	2962	2618	2300	2003	1725	1464	1217	0984	0763	0552	0352	0160	8
9	2956	2613	2295	1998	1720	1459	1213	0980	0759	0549	0348	0157	9
10	0.2950	0.2607	0.2289	0.1993	0.1716	0.1455	0.1209	0.0977	0.0756	0.0546	0.0345	0.0153	10
11	2944	2602	2284	1988	1711	1451	1205	0973	0753	0542	0342	0150	11
12	2938	2596	2279	1984	1707	1447	1201	0969	0749	0539	0339	0147	12
13	2933	2591	2274	1979	1702	1443	1197	0965	0745	0535	0335	0144	13
14	2927	2585	2269	1974	1698	1438	1193	0962	0741	0532	0332	0141	14
15	0.2921	0.2580	0.2264	0.1969	0.1694	0.1434	0.1189	0.0958	0.0738	0.0528	0.0329	0.0138	15
16	2915	2574	2259	1965	1689	1430	1185	0954	0734	0525	0326	0135	16
17	2909	2569	2254	1960	1685	1426	1181	0950	0731	0522	0322	0132	17
18	2903	2564	2249	1955	1680	1422	1178	0947	0727	0518	0319	0128	18
19	2897	2558	2244	1950	1676	1417	1174	0943	0724	0515	0316	0125	19
20	0.2891	0.2553	0.2239	0.1946	0.1671	0.1413	0.1170	0.0939	0.0720	0.0511	0.0313	0.0122	20
21	2885	2547	2234	1941	1667	1409	1166	0935	0716	0508	0309	0119	21
22	2880	2542	2229	1936	1662	1405	1162	0932	0713	0505	0306	0116	22
23	2874	2536	2223	1932	1658	1401	1158	0928	0709	0501	0303	0113	23
24	2868	2531	2218	1927	1654	1397	1154	0924	0706	0498	0300	0110	24
25	0.2862	0.2526	0.2213	0.1922	0.1649	0.1392	0.1150	0.0920	0.0702	0.0495	0.0296	0.0107	25
26	2856	2520	2208	1917	1645	1388	1146	0917	0699	0491	0293	0104	26
27	2850	2515	2203	1913	1640	1384	1142	0913	0695	0488	0290	0101	27
28	2845	2510	2198	1908	1636	1380	1138	0909	0692	0484	0287	0098	28
29	2839	2504	2193	1903	1632	1376	1134	0905	0688	0481	0283	0094	29
30	0.2833	0.2499	0.2188	0.1899	0.1627	0.1372	0.1130	0.0902	0.0685	0.0478	0.0280	0.0091	30
31	2827	2493	2183	1894	1623	1368	1126	0898	0681	0474	0277	0088	31
32	2821	2488	2178	1889	1618	1363	1123	0895	0677	0471	0274	0085	32
33	2816	2483	2173	1885	1614	1359	1119	0891	0674	0468	0271	0082	33
34	2810	2477	2168	1880	1610	1355	1115	0887	0670	0464	0267	0079	34
35	0.2804	0.2472	0.2163	0.1875	0.1605	0.1351	0.1111	0.0883	0.0667	0.0461	0.0264	0.0076	35
36	2798	2467	2159	1871	1601	1347	1107	0880	0663	0458	0261	0073	36
37	2793	2461	2154	1866	1597	1343	1103	0876	0660	0454	0258	0070	37
38	2787	2456	2149	1862	1592	1339	1099	0872	0656	0451	0255	0067	38
39	2781	2451	2144	1857	1588	1335	1095	0868	0653	0447	0251	0064	39
40	0.2775	0.2445	0.2139	0.1852	0.1584	0.1331	0.1091	0.0865	0.0649	0.0444	0.0248	0.0061	40
41	2770	2440	2134	1848	1579	1326	1088	0861	0646	0441	0215	0058	41
42	2764	2435	2129	1843	1575	1322	1084	0858	0642	0438	0212	0055	42
43	2758	2430	2124	1838	1571	1318	1080	0854	0639	0434	0239	0052	43
44	2753	2424	2119	1834	1566	1314	1076	0850	0635	0431	0235	0048	44
45	0.2747	0.2419	0.2114	0.1829	0.1562	0.1310	0.1072	0.0846	0.0632	0.0427	0.0232	0.0045	45
46	2741	2414	2109	1825	1558	1306	1068	0843	0628	0424	0229	0042	46
47	2736	2409	2104	1820	1553	1302	1064	0839	0625	0421	0226	0039	47
48	2730	2403	2099	1816	1549	1298	1060	0835	0621	0418	0223	0036	48
49	2721	2398	2095	1811	1545	1294	1057	0832	0618	0414	0220	0033	49
50	0.2719	0.2393	0.2090	0.1806	0.1540	0.1290	0.1053	0.0828	0.0614	0.0411	0.0216	0.0030	50
51	2713	2388	2085	1802	1536	1286	1049	0824	0611	0408	0213	0027	51
52	2707	2382	2080	1797	1532	1282	1045	0821	0608	0404	0210	0024	52
53	2702	2377	2075	1793	1527	1278	1041	0817	0604	0401	0207	0021	53
54	2696	2372	2070	1788	1523	1274	1037	0814	0601	0398	0204	0018	54
55	0.2690	0.2367	0.2065	0.1784	0.1519	0.1270	0.1034	0.0810	0.0597	0.0394	0.0201	0.0015	55
56	2685	2362	2061	1779	1515	1265	1030	0806	0594	0391	0197	0012	56
57	2679	2356	2056	1774	1510	1261	1026	0803	0590	0388	0194	0009	57
58	2674	2351	2051	1770	1506	1257	1022	0799	0587	0384	0191	0006	58
59	2668	2346	2046	1765	1502	1253	1018	0795	0583	0381	0188	0003	59
	12	13	14	15	16	17	18	19	20	21	22	23	

TABLE XI.

LOGARITHMS of the LATITUDE and POLAR DISTANCE.

	LATITUDE, OR POLAR DISTANCE.										
M.	0° or 90°	1° . 91°	2° . 92°	3° . 93°	4° . 94°	5° . 95°	6° . 96°	7° . 97°	8° . 98°	9° . 99°	
0	0.00000	00007	00026	00060	00106	00166	00239	00325	00425	00538	60
1	00000	00007	00027	00060	00107	00167	00240	00326	00426	00540	59
2	00000	00007	00027	00061	00108	00168	00241	00328	00428	00542	58
3	00000	00007	00028	00062	00108	00169	00243	00330	00430	00544	57
4	00000	00008	00028	00062	00109	00170	00244	00331	00432	00546	56
5	0.00000	00008	00029	00063	00110	00171	00245	00333	00434	00548	55
6	00000	00008	00029	00064	00111	00172	00247	00334	00435	00550	54
7	00000	00008	00030	00064	00112	00173	00248	00336	00437	00552	53
8	00000	00008	00030	00065	00113	00175	00249	00337	00439	00554	52
9	00000	00009	00031	00066	00114	00176	00251	00339	00441	00556	51
10	0.00000	00009	00031	00066	00115	00177	00252	00341	00443	00558	50
11	00000	00009	00032	00067	00116	00178	00253	00342	00444	00560	49
12	00000	00010	00032	00068	00117	00179	00255	00344	00446	00562	48
13	00000	00010	00033	00068	00118	00180	00256	00345	00448	00564	47
14	00000	00010	00033	00069	00119	00181	00258	00347	00450	00566	46
15	0.00000	00010	00033	00070	00120	00183	00259	00349	00452	00568	45
16	00000	00011	00034	00071	00121	00184	00260	00350	00454	00571	44
17	00001	00011	00034	00071	00121	00185	00262	00352	00455	00573	43
18	00001	00011	00035	00072	00122	00186	00263	00353	00457	00575	42
19	00001	00011	00036	00073	00123	00187	00264	00355	00459	00577	41
20	0.00001	00012	00036	00074	00124	00188	00266	00357	00461	00579	40
21	00001	00012	00037	00074	00125	00190	00267	00358	00463	00581	39
22	00001	00012	00037	00075	00126	00191	00269	00360	00465	00583	38
23	00001	00013	00038	00076	00127	00192	00270	00362	00467	00585	37
24	00001	00013	00038	00077	00128	00193	00272	00363	00468	00587	36
25	0.00001	00013	00039	00077	00129	00194	00273	00365	00470	00589	35
26	00001	00014	00039	00078	00130	00196	00274	00367	00472	00591	34
27	00001	00014	00040	00079	00131	00197	00276	00368	00474	00593	33
28	00001	00014	00040	00080	00132	00198	00277	00370	00476	00596	32
29	00002	00015	00041	00080	00133	00199	00279	00371	00478	00598	31
30	0.00002	00015	00041	00081	00134	00200	00280	00373	00480	00600	30
31	00002	00015	00042	00082	00135	00202	00282	00375	00482	00602	29
32	00002	00016	00042	00083	00136	00203	00283	00376	00183	00604	28
33	00002	00016	00043	00083	00137	00204	00284	00378	00485	00606	27
34	00002	00016	00044	00084	00138	00205	00286	00380	00487	00608	26
35	0.00002	00017	00044	00085	00139	00207	00287	00382	00489	00610	25
36	00002	00017	00045	00086	00140	00208	00289	00383	00491	00612	24
37	00003	00017	00045	00087	00141	00209	00290	00385	00493	00615	23
38	00003	00018	00046	00087	00142	00210	00292	00387	00495	00617	22
39	00003	00018	00046	00088	00143	00212	00293	00388	00497	00619	21
40	0.00003	00018	00047	00089	00144	00213	00295	00390	00499	00621	20
41	00003	00019	00048	00090	00145	00214	00296	00392	00501	00623	19
42	00003	00019	00048	00091	00146	00215	00298	00393	00503	00625	18
43	00003	00019	00049	00091	00147	00217	00299	00395	00505	00628	17
44	00004	00020	00049	00092	00148	00218	00301	00397	00506	00630	16
45	0.00004	00020	00050	00093	00149	00219	00302	00399	00508	00632	15
46	00004	00021	00051	00094	00150	00220	00304	00400	00510	00634	14
47	00004	00021	00051	00095	00152	00222	00305	00402	00512	00636	13
48	00004	00021	00052	00096	00153	00223	00307	00404	00514	00638	12
49	00004	00022	00052	00096	00154	00224	00308	00405	00516	00641	11
50	0.00005	00022	00053	00097	00155	00225	00310	00407	00518	00643	10
51	00005	00023	00054	00098	00156	00227	00311	00409	00520	00645	9
52	00005	00023	00054	00099	00157	00228	00313	00411	00522	00647	8
53	00005	00023	00055	00100	00158	00229	00314	00412	00524	00649	7
54	00005	00024	00056	00101	00159	00231	00316	00414	00526	00652	6
55	0.00006	00024	00056	00102	00160	00232	00317	00416	00528	00654	5
56	00006	00025	00057	00102	00161	00233	00319	00418	00530	00656	4
57	00006	00025	00058	00103	00162	00235	00320	00419	00532	00658	3
58	00906	00026	00058	00104	00163	00236	00322	00421	00534	00660	2
59	00006	00026	00059	00105	00164	00237	00323	00423	00536	00663	1
60	00000	00026	00060	00106	00165	00239	00325	00425	00538	00665	0
	89°	88°	87°	86°	85°	84°	83°	82°	81°	80°	M.
	POLAR DISTANCE.										

TABLE XI.

LOGARITHMS of the LATITUDE and POLAR DISTANCE.

LATITUDE, OR POLAR DISTANCE.

M.	10° or 100°	11°.101°	12°.102°	13°.103°	14°.104°	15°.105°	16°.106°	17°.107°	18°.108°	19°.109°	
0	0.00665	00805	00960	01128	01310	01506	01716	01940	02179	02433	60
1	00667	00808	00962	01131	01313	01509	01719	01944	02183	02437	59
2	00669	00810	00965	01133	01316	01512	01723	01948	02188	02442	58
3	00672	00813	00968	01136	01319	01516	01727	01952	02192	02446	57
4	00674	00815	00970	01139	01322	01519	01730	01956	02196	02450	56
5	0.00676	00818	00973	01142	01325	01523	01734	01960	02200	02455	55
6	00678	00820	00976	01145	01329	01526	01738	01964	02204	02459	54
7	00681	00823	00978	01148	01332	01529	01741	01968	02208	02464	53
8	00683	00825	00981	01151	01335	01533	01745	01971	02212	02468	52
9	00685	00828	00984	01154	01338	01536	01748	01975	02216	02472	51
10	0.00687	00830	00987	01157	01341	01540	01752	01979	02221	02477	50
11	00690	00833	00989	01160	01344	01543	01756	01983	02225	02481	49
12	00692	00835	00992	01163	01348	01547	01760	01987	02229	02485	48
13	00694	00838	00995	01166	01351	01550	01763	01991	02233	02490	47
14	00696	00840	00998	01169	01354	01553	01767	01995	02237	02494	46
15	0.00699	00843	01000	01172	01357	01557	01771	01999	02241	02499	45
16	00701	00845	01003	01175	01360	01560	01774	02003	02246	02503	44
17	00703	00848	01006	01178	01364	01564	01778	02007	02250	02508	43
18	00706	00850	01009	01181	01367	01567	01782	02011	02254	02512	42
19	00708	00853	01011	01184	01370	01571	01785	02014	02258	02516	41
20	0.00710	00855	01014	01187	01373	01574	01789	02018	02262	02521	40
21	00712	00858	01017	01190	01377	01578	01793	02022	02266	02525	39
22	00715	00860	01020	01193	01380	01581	01796	02026	02271	02530	38
23	00717	00863	01022	01196	01383	01585	01800	02030	02275	02534	37
24	00719	00865	01025	01199	01386	01588	01804	02034	02279	02539	36
25	0.00722	00868	01028	01202	01390	01591	01808	02038	02283	02543	35
26	00724	00870	01031	01205	01393	01595	01811	02042	02287	02547	34
27	00726	00873	01033	01208	01396	01598	01815	02046	02292	02552	33
28	00729	00876	01036	01211	01399	01602	01819	02050	02296	02556	32
29	00731	00878	01039	01214	01403	01605	01823	02054	02300	02561	31
30	0.00733	00881	01042	01217	01406	01609	01826	02058	02304	02565	30
31	00736	00883	01045	01220	01409	01612	01830	02062	02309	02570	29
32	00738	00886	01047	01223	01412	01616	01834	02066	02313	02574	28
33	00740	00888	01050	01226	01416	01619	01838	02070	02317	02579	27
34	00743	00891	01053	01229	01419	01623	01841	02074	02321	02583	26
35	0.00745	00894	01056	01232	01422	01627	01845	02078	02326	02588	25
36	00748	00896	01059	01235	01426	01630	01849	02082	02330	02592	24
37	00750	00899	01062	01238	01429	01634	01853	02086	02334	02597	23
38	00752	00901	01064	01241	01432	01637	01856	02090	02338	02601	22
39	00755	00904	01067	01244	01435	01641	01860	02094	02343	02606	21
40	0.00757	00907	01070	01247	01439	01644	01864	02098	02347	02610	20
41	00759	00909	01073	01250	01442	01648	01868	02102	02351	02615	19
42	00762	00912	01076	01254	01445	01651	01871	02106	02355	02619	18
43	00764	00914	01079	01257	01449	01655	01875	02110	02360	02624	17
44	00767	00917	01081	01260	01452	01658	01879	02114	02364	02628	16
45	0.00769	00920	01084	01263	01455	01662	01883	02118	02368	02633	15
46	00771	00922	01087	01266	01459	01666	01887	02122	02372	02637	14
47	00774	00925	01090	01269	01462	01669	01890	02126	02377	02642	13
48	00776	00928	01093	01272	01465	01673	01894	02130	02381	02647	12
49	00779	00930	01096	01275	01469	01676	01898	02134	02385	02651	11
50	0.00781	00933	01099	01278	01472	01680	01902	02139	02390	02656	10
51	00783	00936	01102	01281	01475	01683	01906	02143	02394	02660	9
52	00786	00938	01104	01285	01479	01687	01910	02147	02398	02665	8
53	00788	00941	01107	01288	01482	01691	01913	02151	02403	02669	7
54	00791	00944	01110	01291	01485	01694	01917	02155	02407	02674	6
55	0.00793	00946	01113	01294	01489	01698	01921	02159	02411	02678	5
56	00796	00949	01116	01297	01492	01701	01925	02163	02416	02683	4
57	00798	00952	01119	01300	01495	01705	01929	02167	02420	02688	3
58	00800	00954	01122	01303	01499	01709	01933	02171	02424	02692	2
59	00803	00957	01125	01306	01502	01712	01937	02175	02429	02697	1
60	00805	00960	01128	01310	01506	01716	01940	02179	02433	02701	0
	79°	78°	77°	76°	75°	74°	73°	72°	71°	70°	M.

POLAR DISTANCE.

TABLE XI.

LOGARITHMS of the LATITUDE and POLAR DISTANCE.

LATITUDE, OR POLAR DISTANCE.

M.	20° or 110°	21°.111°	22°.112°	23°.113°	24°.114°	25°.115°	26°.116°	27°.117°	28°.118°	29°.119°	
0	0.02701	02985	03283	03597	03927	04272	04634	05012	05407	05818	60
1	02706	02990	03289	03603	03933	04278	04640	05018	05413	05825	59
2	02711	02995	03294	03608	03938	04284	04646	05025	05420	05832	58
3	02715	02999	03299	03613	03944	04290	04652	05031	05427	05839	57
4	02720	03004	03304	03619	03950	04296	04659	05038	05433	05846	56
5	0.02724	03009	03309	03624	03955	04302	04665	05044	05440	05853	55
6	02729	03014	03314	03630	03961	04308	04671	05051	05447	05860	54
7	02734	03019	03319	03635	03966	04314	04677	05057	05454	05867	53
8	02738	03024	03324	03640	03972	04320	04683	05064	05460	05874	52
9	02743	03029	03330	03646	03978	04326	04690	05070	05467	05881	51
10	0.02748	03034	03335	03651	03983	04332	04696	05077	05474	05888	50
11	02752	03038	03340	03657	03989	04337	04702	05083	05481	05895	49
12	02757	03043	03345	03662	03995	04343	04708	05089	05487	05902	48
13	02762	03048	03350	03667	04000	04349	04714	05096	05494	05910	47
14	02766	03053	03355	03673	04006	04355	04721	05102	05501	05917	46
15	0.02771	03058	03360	03678	04012	04361	04727	05109	05508	05924	45
16	02776	03063	03366	03684	04018	04367	04733	05115	05515	05931	44
17	02780	03068	03371	03689	04023	04373	04739	05122	05521	05938	43
18	02785	03073	03376	03695	04029	04379	04746	05129	05528	05945	42
19	02790	03078	03381	03700	04035	04385	04752	05135	05535	05952	41
20	0.02794	03083	03386	03706	04040	04391	04758	05142	05542	05959	40
21	02799	03088	03392	03711	04046	04397	04764	05148	05549	05966	39
22	02804	03093	03397	03716	04052	04403	04771	05155	05555	05973	38
23	02808	03097	03402	03722	04058	04409	04777	05161	05562	05980	37
24	02813	03102	03407	03727	04063	04415	04783	05168	05569	05988	36
25	0.02818	03107	03412	03733	04069	04421	04789	05174	05576	05995	35
26	02822	03112	03418	03738	04075	04427	04796	05181	05583	06002	34
27	02827	03117	03423	03744	04080	04433	04802	05187	05590	06009	33
28	02832	03122	03428	03749	04086	04439	04808	05194	05596	06016	32
29	02837	03127	03433	03755	04092	04445	04815	05201	05603	06023	31
30	0.02841	03132	03438	03760	04098	04451	04821	05207	05610	06030	30
31	02846	03137	03444	03766	04103	04457	04827	05214	05617	06037	29
32	02851	03142	03449	03771	04109	04463	04833	05220	05624	06045	28
33	02855	03147	03454	03777	04115	04469	04840	05227	05631	06052	27
34	02860	03152	03459	03782	04121	04475	04846	05233	05638	06059	26
35	0.02865	03157	03465	03788	04127	04481	04852	05240	05645	06066	25
36	02870	03162	03470	03793	04132	04487	04859	05247	05651	06073	24
37	02874	03167	03475	03799	04138	04493	04865	05253	05658	06080	23
38	02879	03172	03480	03804	04144	04500	04871	05260	05665	06088	22
39	02884	03177	03486	03810	04150	04506	04878	05266	05672	06095	21
40	0.02889	03182	03491	03815	04156	04512	04884	05273	05679	06102	20
41	02893	03187	03496	03821	04161	04518	04890	05280	05686	06109	19
42	02898	03192	03502	03826	04167	04524	04897	05286	05693	06116	18
43	02903	03197	03507	03832	04173	04530	04903	05293	05700	06124	17
44	02908	03202	03512	03838	04179	04536	04910	05300	05707	06131	16
45	0.02913	03207	03517	03843	04185	04542	04916	05306	05714	06138	15
46	02917	03212	03523	03849	04190	04548	04922	05315	05721	06145	14
47	02922	03217	03528	03854	04196	04554	04929	05320	05727	06153	13
48	02927	03222	03533	03860	04202	04560	04935	05326	05734	06160	12
49	02932	03228	03539	03865	04208	04566	04941	05333	05741	06167	11
50	0.02937	03233	03544	03871	04214	04573	04948	05340	05748	06174	10
51	02941	03238	03549	03877	04220	04579	04954	05316	05755	06181	9
52	02946	03243	03555	03882	04225	04585	04961	05353	05762	06189	8
53	02951	03248	03560	03888	04231	04591	04967	05360	05769	06196	7
54	02956	03253	03565	03893	04237	04597	04973	05366	05776	06203	6
55	0.02961	03258	03571	03899	04243	04603	04980	05373	05783	06211	5
56	02965	03263	03576	03905	04249	04609	04986	05380	05796	06218	4
57	02970	03268	03581	03910	04255	04616	04993	05386	05797	06225	3
58	02975	03273	03587	03916	04261	04622	04999	05393	05804	06232	2
59	02980	03278	03592	03921	04267	04628	05005	05400	05811	06240	1
60	02985	03283	03597	03927	04272	04634	05012	05407	05818	06247	0
	69°	68°	67°	66°	65°	64°	63°	62°	61°	60°	M.

POLAR DISTANCE.

TABLE XI.

Logarithms of the Latitude and Polar Distance.

LATITUDE, OR POLAR DISTANCE

M.	30° or 120°	31°.121°	32°.122°	33°.123°	34°.124°	35°.125°	36°.126°	27°.127°	38°.128°	39°.129°	
0	0.06247	06693	07158	07641	08143	08664	09204	09765	10347	10950	60
1	06254	06701	07166	07649	08151	08672	09213	09775	10357	10960	59
2	06262	06709	07174	07657	08160	08681	09223	09784	10367	10970	58
3	06269	06716	07182	07665	08168	08690	09232	09794	10376	10980	57
4	06276	06724	07190	07674	08177	08699	09211	09803	10386	10991	56
5	0.06283	06731	07197	07682	08185	08708	09250	09813	10396	11001	55
6	06291	06739	07205	07690	08194	08717	09259	09822	10406	11011	54
7	06298	06747	07213	07698	08202	08726	09269	09832	10416	11022	53
8	06305	06754	07221	07707	08211	08734	09278	09841	10426	11032	52
9	06313	06762	07229	07715	08219	08743	09287	09851	10436	11042	51
10	0.06320	06770	07237	07723	08228	08752	09296	09861	10446	11052	50
11	06327	06777	07245	07731	08237	08761	09306	09870	10456	11063	49
12	06335	06785	07253	07740	08245	08770	09315	09880	10466	11073	48
13	06342	06793	07261	07748	08254	08779	09324	09889	10476	11083	47
14	06350	06800	07269	07756	08262	08788	09333	09899	10486	11094	46
15	0.06357	06808	07277	07765	08271	08797	09343	09909	10496	11104	45
16	06364	06816	07285	07773	08280	08806	09352	09918	10505	11114	44
17	06372	06823	07293	07781	08288	08815	09361	09928	10515	11125	43
18	06379	06831	07301	07789	08297	08824	09370	09937	10525	11135	42
19	06386	06839	07309	07798	08305	08833	09380	09947	10535	11145	41
20	0.06394	06846	07317	07806	08314	08842	09389	09957	10545	11156	40
21	06401	06854	07325	07814	08323	08851	09398	09966	10555	11166	39
22	06409	06862	07333	07823	08331	08859	09408	09976	10565	11176	38
23	06416	06869	07341	07831	08340	08868	09417	09986	10575	11187	37
24	06423	06877	07349	07839	08349	08877	09426	09995	10585	11197	36
25	0.06431	06885	07357	07848	08357	08886	09435	10005	10595	11207	35
26	06438	06892	07365	07856	08366	08895	09445	10015	10605	11218	34
27	06446	06900	07373	07864	08375	08904	09454	10024	10615	11228	33
28	06453	06908	07381	07873	08383	08913	09463	10034	10625	11239	32
29	06461	06916	07389	07881	08392	08922	09473	10044	10636	11249	31
30	0.06468	06923	07397	07889	08401	08931	09482	10053	10646	11259	30
31	06475	06931	07405	07898	08409	08940	09491	10063	10656	11270	29
32	06483	06939	07413	07906	08418	08949	09501	10073	10666	11280	28
33	06490	06947	07421	07914	08427	08958	09510	10082	10676	11291	27
34	06498	06954	07429	07923	08435	08967	09520	10092	10686	11301	26
35	0.06505	06962	07437	07931	08444	08977	09529	10102	10696	11312	25
36	06513	06970	07445	07940	08453	08986	09538	10112	10706	11322	24
37	06520	06978	07454	07948	08462	08995	09548	10121	10716	11332	23
38	06528	06986	07462	07956	08470	09004	09557	10131	10726	11343	22
39	06535	06993	07470	07965	08479	09013	09566	10141	10736	11353	21
40	0.06543	07001	07478	07973	08488	09022	09576	10151	10746	11364	20
41	06550	07009	07486	07982	08496	09031	09585	10160	10756	11374	19
42	06558	07017	07494	07990	08505	09040	09595	10170	10767	11385	18
43	06565	07024	07502	07998	08514	09049	09604	10180	10777	11395	17
44	06573	07032	07510	08007	08523	09058	09614	10190	10787	11406	16
45	0.06580	07040	07518	08015	08531	09067	09623	10199	10797	11416	15
46	06588	07048	07527	08024	08540	09076	09632	10209	10807	11427	14
47	06595	07056	07535	08032	08549	09085	09642	10219	10817	11437	13
48	06603	07064	07543	08041	08558	09094	09651	10229	10827	11448	12
49	06610	07071	07551	08049	08567	09104	09661	10239	10838	11458	11
50	0.06618	07079	07559	08058	08575	09115	09670	10248	10848	11469	10
51	06625	07087	07567	08066	08584	09122	09680	10258	10858	11479	9
52	06633	07095	07575	08075	08593	09131	09689	10268	10868	11490	8
53	06640	07103	07584	08084	08602	09140	09699	10278	10878	11501	7
54	06648	07111	07592	08092	08611	09149	09708	10288	10888	11511	6
55	0.06656	07119	07600	08100	08619	09158	09718	10298	10899	11522	5
56	06663	07126	07608	08109	08628	09168	09727	10307	10909	11532	4
57	06671	07134	07616	08117	08637	09177	09737	10317	10919	11543	3
58	06678	07142	07624	08126	08646	09186	09746	10327	10929	11553	2
59	06686	07150	07633	08134	08655	09195	09756	10337	10940	11564	1
60	06693	07158	07641	08143	08664	09204	09765	10347	10950	11575	0
	59°	58°	57°	56°	55°	54°	53°	52°	51°	50°	M.

POLAR DISTANCE.

TABLE XI.

LOGARITHMS of the LATITUDE and POLAR DISTANCE.

	LATITUDE, OR POLAR DISTANCE.										
M.	40° or 130°	41°.131°	42°.132°	43°.133°	44°.134°	45°.135°	46°.136°	47°.137°	48°.138°	48°.139°	
0	0.11575	12222	12893	13587	14307	15051	15823	16622	17449	18306	60
1	11585	12233	12904	13599	14319	15064	15836	16635	17463	18320	59
2	11596	12244	12915	13611	14331	15077	15849	16649	17477	18335	58
3	11606	12255	12927	13623	14343	15089	15862	16662	17491	18349	57
4	11617	12266	12938	13634	14355	15102	15875	16676	17505	18364	56
5	0.11628	12277	12950	13646	14368	15115	15888	16689	17519	18378	55
6	11638	12288	12961	13658	14380	15127	15901	16703	17533	18393	54
7	11649	12299	12972	13670	14392	15140	15915	16717	17547	18408	53
8	11660	12310	12984	13682	14404	15153	15928	16730	17561	18422	52
9	11670	12321	12995	13694	14417	15165	15941	16744	17576	18437	51
10	0.11681	12332	13007	13705	14429	15178	15954	16758	17590	18451	50
11	11692	12343	13018	13717	14441	15191	15967	16771	17604	18466	49
12	11702	12354	13030	13729	14453	15204	15980	16785	17618	18481	48
13	11713	12365	13041	13741	14466	15216	15994	16798	17632	18495	47
14	11724	12376	13053	13753	14478	15229	16007	16812	17646	18510	46
15	0.11734	12387	13064	13765	14490	15242	16020	16826	17660	18525	45
16	11745	12399	13076	13777	14503	15255	16033	16839	17674	18539	44
17	11756	12410	13087	13789	14515	15267	16046	16853	17689	18554	43
18	11766	12421	13098	13800	14527	15280	16060	16867	17703	18569	42
19	11777	12432	13110	13812	14540	15293	16073	16880	17717	18583	41
20	0.11788	12443	13121	13824	14552	15306	16086	16894	17731	18598	40
21	11799	12454	13133	13836	14564	15318	16099	16908	17745	18613	39
22	11809	12465	13145	13848	14577	15331	16113	16922	17760	18628	38
23	11820	12476	13156	13860	14589	15344	16126	16935	17774	18642	37
24	11831	12487	13168	13872	14601	15357	16139	16949	17788	18657	36
25	0.11842	12499	13179	13884	14614	15370	16152	16963	17802	18672	35
26	11852	12510	13191	13896	14626	15382	16166	16977	17816	18686	34
27	11863	12521	13202	13908	14639	15395	16179	16990	17831	18701	33
28	11874	12532	13214	13920	14651	15408	16192	17004	17845	18716	32
29	11885	12543	13225	13932	14663	15421	16205	17018	17859	18731	31
30	0.11895	12554	13237	13944	14676	15434	16219	17032	17874	18746	30
31	11906	12566	13248	13956	14688	15447	16232	17045	17888	18760	29
32	11917	12577	13260	13968	14701	15460	16245	17059	17902	18775	28
33	11928	12588	13272	13980	14713	15472	16259	17073	17916	18790	27
34	11939	12599	13283	13992	14726	15485	16272	17087	17931	18805	26
35	0.11949	12610	13295	14004	14738	15498	16285	17101	17945	18820	25
36	11960	12622	13306	14016	14750	15511	16299	17115	17959	18834	24
37	11971	12633	13318	14028	14763	15524	16312	17128	17974	18849	23
38	11982	12644	13330	14040	14775	15537	16326	17142	17988	18864	22
39	11993	12655	13341	14052	14788	15550	16339	17156	18002	18879	21
40	0.12004	12666	13353	14064	14800	15563	16352	17170	18017	18894	20
41	12015	12678	13365	14076	14813	15576	16366	17184	18031	18909	19
42	12025	12689	13376	14088	14825	15589	16379	17198	18045	18924	18
43	12036	12700	13388	14100	14838	15602	16392	17212	18060	18939	17
44	12047	12712	13400	14112	14850	15615	16406	17225	18074	18954	16
45	0.12058	12723	13411	14124	14863	15627	16419	17239	18089	18968	15
46	12069	12734	13423	14136	14875	15640	16433	17253	18103	18983	14
47	12080	12745	13435	14149	14888	15653	16446	17267	18118	18998	13
48	12091	12757	13446	14161	14900	15666	16460	17281	18132	19013	12
49	12102	12768	13458	14173	14913	15679	16473	17295	18146	19028	11
50	0.12113	12779	13470	14185	14926	15692	16487	17309	18161	19043	10
51	12123	12791	13482	14197	14938	15705	16500	17323	18175	19058	9
52	12134	12802	13493	14209	14951	15718	16514	17337	18190	19073	8
53	12145	12813	13505	14221	14963	15731	16527	17351	18204	19088	7
54	12156	12825	13517	14234	14976	15745	16541	17365	18219	19103	6
55	0.12167	12836	13528	14246	14988	15758	16554	17379	18233	19118	5
56	12178	12847	13540	14258	15001	15771	16568	17393	18248	19133	4
57	12189	12859	13552	14270	15014	15784	16581	17407	18262	19148	3
58	12200	12870	13564	14282	15026	15797	16595	17421	18277	19163	2
59	12211	12881	13575	14294	15039	15810	16608	17435	18291	19178	1
60	12222	12893	13587	14307	15051	15823	16622	17449	18306	19193	0
	49°	48°	47°	46°	45°	44°	43°	42°	41°	40°	M.
	POLAR DISTANCE.										

TABLE XI.

Logarithms of the Latitude and Polar Distance.

LATITUDE.

M.	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	
0	0.19193	20113	21066	22054	23078	24141	25244	26389	27579	28816	60
1	19208	20128	21082	22070	23096	24159	25263	26409	27599	28837	59
2	19223	20144	21098	22087	23113	24177	25281	26428	27619	28858	58
3	19238	20160	21114	22104	23130	24195	25300	26448	27640	28879	57
4	19254	20175	21131	22121	23148	24213	25319	26467	27660	28900	56
5	0.19269	20191	21147	22138	23165	24231	25338	26487	27680	28921	55
6	19284	20207	21163	22154	23183	24249	25356	26506	27701	28942	54
7	19299	20222	21179	22171	23200	24267	25375	26526	27721	28964	53
8	19314	20238	21195	22188	23218	24286	25394	26545	27741	28985	52
9	19329	20254	21212	22205	23235	24304	25413	26565	27762	29006	51
10	0.19344	20269	21228	22222	23253	24322	25432	26584	28782	29027	50
11	19359	20285	21244	22239	23270	24340	25451	26604	27802	29048	49
12	19375	20301	21261	22256	23288	24358	25469	26623	27823	29069	48
13	19390	20316	21277	22273	23305	24376	25488	26643	27843	29091	47
14	19405	20332	21293	22289	23323	24395	25507	26663	27863	29112	46
15	0.19420	20348	21309	22306	23340	24413	25526	26682	27884	29133	45
16	19435	20364	21326	22323	23358	24431	25545	26702	27904	29154	44
17	19450	20379	21342	22340	23375	24449	25564	26722	27925	29176	43
18	19466	20395	21358	22357	23393	24467	25583	26741	27945	29197	42
19	19481	20411	21375	22374	23410	24486	25602	26761	27966	29218	41
20	0.19496	20427	21391	22391	23428	24504	25621	26781	27986	29239	40
21	19511	20442	21408	22408	23446	24522	25640	26800	28006	29261	39
22	19527	20458	21424	22425	23463	24541	25659	26820	28027	29282	38
23	19542	20474	21440	22442	23481	24559	25678	26840	28048	29303	37
24	19557	20490	21457	22459	23499	24577	25697	26860	28068	29325	36
25	0.19572	20506	21473	22476	23516	24595	25716	26879	28089	29346	35
26	19588	20522	21490	22493	23534	24614	25735	26899	28109	29367	34
27	19603	20537	21506	22510	23552	24632	25754	26919	28130	29389	33
28	19618	20553	21522	22527	23569	24650	25773	26939	28150	29410	32
29	19634	20569	21539	22544	23587	24669	25792	26959	28171	29432	31
30	0.19649	20585	21555	22561	23605	24687	25811	26978	28191	29453	30
31	19664	20601	21572	22578	23622	24706	25830	26998	28212	29475	29
32	19680	20617	21588	22595	23640	24724	25849	27018	28233	29496	28
33	19695	20633	21605	22613	23658	24742	25868	27038	28253	29518	27
34	19710	20649	21621	22630	23676	24761	25887	27058	28274	29539	26
35	0.19726	20665	21638	22647	23693	24779	25907	27078	28295	29561	25
36	19741	20681	21654	22664	23711	24798	25926	27098	28315	29582	24
37	19756	20696	21671	22681	23729	24816	25945	27117	28336	29604	23
38	19772	20712	21687	22698	23747	24835	25964	27137	28357	29625	22
39	19787	20728	21704	22715	23764	24853	25983	27157	28378	29647	21
40	0.19803	20744	21720	22732	23782	24872	26003	27177	28398	29668	20
41	19818	20760	21737	22750	23800	24890	26022	27197	28419	29690	19
42	19834	20776	21754	22767	23818	24909	26041	27217	28440	29712	18
43	19849	20792	21770	22784	23836	24927	26060	27237	28461	29733	17
44	19864	20808	21787	22801	23854	24946	26079	27257	28481	29755	16
45	0.19880	20824	21803	22819	23871	24964	26099	27277	28502	29776	15
46	19895	20840	21820	22836	23889	24983	26118	27297	28523	29798	14
47	19911	20856	21837	22853	23907	25001	26137	27317	28544	29820	13
48	19926	20872	21853	22870	23925	25020	26157	27337	28565	29841	12
49	19942	20889	21870	22888	23943	25039	26176	27357	28586	29863	11
50	0.19957	20905	21887	22905	23961	25057	26195	27378	28607	29885	10
51	19973	20921	21903	22922	23979	25076	26215	27398	28627	29907	9
52	19988	20937	21920	22939	23997	25094	26234	27418	28648	29928	8
53	20004	20953	21937	22957	24015	25113	26253	27438	28669	29950	7
54	20019	20969	21953	22974	24033	25132	26273	27458	28690	29972	6
55	0.20035	20985	21970	22991	24051	25150	26292	27478	28711	29994	5
56	20050	21001	21987	23009	24069	25169	26311	27498	28732	30016	4
57	20066	21017	22003	23026	24087	25188	26331	27518	28753	30037	3
58	20082	21033	22020	23043	24105	25206	26350	27539	28774	30059	2
59	20097	21050	22037	23061	24123	25225	26370	27559	28795	30081	1
60	20113	21066	22054	23078	24141	25244	26389	27579	28816	30103	0
	39°	38°	37°	36°	35°	34°	33°	32°	31°	30°	M.

POLAR DISTANCE.

TABLE XI.

LOGARITHMS of the LATITUDE and POLAR DISTANCE.

	LATITUDE.										
M.	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	
0	0.30103	31443	32839	34295	35816	37405	39069	40812	42612	44567	60
1	30125	31466	32863	34320	35842	37432	39097	40842	42674	44600	59
2	30147	31488	32887	34345	35868	37459	39125	40872	42705	44633	58
3	30169	31511	32910	34370	35894	37487	39154	40902	42736	44666	57
4	30191	31534	32934	34395	35920	37514	39182	40931	42768	44699	56
5	0.30213	31557	32958	34420	35946	37541	39211	40961	42799	44732	55
6	30235	31580	32982	34444	35972	37568	39239	40991	42831	44765	54
7	30257	31603	33006	34469	35998	37595	39268	41021	42862	44798	53
8	30279	31626	33030	34494	36024	37623	39296	41051	42893	44831	52
9	30301	31649	33054	34519	36050	37650	39325	41081	42925	44864	51
10	0.30323	31672	33078	34544	36076	37677	39354	41111	42956	44898	50
11	30345	31695	33101	34569	36102	37704	39382	41141	42988	44931	49
12	30367	31718	33125	34594	36128	37732	39411	41171	43020	44964	48
13	30389	31740	33149	34619	36154	37759	39439	41201	43051	44997	47
14	30411	31763	33173	34644	36180	37786	39468	41231	43083	45031	46
15	0.30433	31787	33197	34669	36206	37814	39497	41261	43114	45064	45
16	30455	31810	33221	34694	36233	37841	39526	41291	43146	45097	44
17	30477	31833	33245	34719	36259	37869	39554	41322	43178	45131	43
18	30499	31856	33269	34745	36285	37896	39583	41352	43210	45164	42
19	30521	31879	33294	34770	36311	37924	39612	41382	43241	45198	41
20	0.30544	31902	33318	34795	36338	37951	39641	41412	43273	45231	40
21	30566	31925	33342	34820	36364	37979	39669	41443	43305	45265	39
22	30588	31948	33366	34845	36390	38006	39698	41473	43337	45298	38
23	30610	31971	33390	34870	36417	38034	39727	41503	43369	45332	37
24	30632	31994	33414	34896	36443	38061	39756	41533	43401	45365	36
25	0.30655	32018	33438	34921	36469	38089	39785	41564	43432	45399	35
26	30677	32041	33463	34946	36496	38117	39814	41594	43464	45433	34
27	30699	32064	33487	34971	36522	38144	39843	41625	43496	45466	33
28	30721	32087	33511	34997	36549	38172	39872	41655	43528	45500	32
29	30744	32110	33535	35022	36575	38200	39901	41686	43560	45534	31
30	0.30766	32134	33559	35047	36602	38227	39930	41716	43592	45567	30
31	30788	32157	33584	35073	36628	38255	39959	41747	43625	45601	29
32	30811	32180	33608	35098	36655	38283	39988	41777	43657	45635	28
33	30833	32204	33632	35123	36681	38311	40017	41808	43689	45669	27
34	30856	32227	33657	35149	36708	38338	40046	41838	43721	45703	26
35	0.30878	32250	33681	35174	36734	38366	40076	41869	43753	45737	25
36	30900	32274	33705	35200	36761	38394	40105	41899	43785	45771	24
37	30923	32297	33730	35225	36787	38422	40134	41930	43818	45805	23
38	30945	32320	33754	35251	36814	38450	40163	41961	43850	45839	22
39	30968	32344	33779	35276	36841	38478	40192	41992	43882	45873	21
40	0.30990	32367	33803	35302	36867	38506	40222	42022	43915	45907	20
41	31013	32391	33827	35327	36894	38534	40251	42053	43947	45941	19
42	31035	32414	33852	35353	36921	38562	40280	42084	43979	45975	18
43	31058	32438	33876	35378	36948	38590	40310	42115	44012	46009	17
44	31080	32461	33901	35404	36974	38618	40339	42145	44044	46043	16
45	0.31103	32485	33925	35429	37001	38646	40368	42176	44077	46078	15
46	31125	32508	33950	35455	37028	38674	40398	42207	44109	46112	14
47	31148	32532	33975	35481	37055	38702	40427	42238	44142	46146	13
48	31171	32555	33999	35506	37082	38730	40457	42269	44174	46181	12
49	31193	32579	34024	35532	37108	38758	40486	42300	44207	46215	11
50	0.31216	32602	34048	35558	37135	38786	40516	42331	44239	46249	10
51	31238	32626	34073	35583	37162	38814	40545	42362	44272	46284	9
52	31261	32650	34098	35609	37189	38842	40575	42393	44305	46318	8
53	31284	32673	34122	35635	37216	38871	40604	42424	44337	46353	7
54	31306	32697	34147	35661	37243	38899	40634	42455	44370	46387	6
55	0.31329	32720	34172	35687	37270	38927	40664	42486	44403	46422	5
56	31352	32744	34196	35712	37297	38955	40693	42518	44436	46456	4
57	31375	32768	34221	35738	37324	38984	40723	42549	44468	46491	3
58	31397	32792	34246	35764	37351	39012	40753	42580	44501	46525	2
59	31420	32815	34271	35790	37378	39040	40782	42611	44534	46560	1
60	31443	32839	34295	35816	37405	39069	40812	42642	44567	46595	0
	29°	28°	27°	26°	25°	24°	23°	22°	21°	20°	M.
	POLAR DISTANCE.										

TABLE XI.

LOGARITHMS of the LATITUDE and POLAR DISTANCE.

LATITUDE.

M.	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	
0	0.46595	48736	51002	53406	55966	58700	61632	64791	68212	71940	60
1	46630	48773	51041	53448	56010	58748	61683	64846	68272	72005	59
2	46664	48809	51080	53489	56054	58795	61734	64901	68331	72070	58
3	46699	48846	51119	53531	56099	58842	61725	64956	68391	72136	57
4	46734	48883	51158	53572	56143	58890	61836	65011	68451	72201	56
5	0.46769	48920	51197	53614	56187	58937	61887	65066	68510	72266	55
6	46804	48957	51236	53655	56231	58984	61938	65121	68570	72332	54
7	46839	48993	51275	53697	56276	59032	61989	65176	68630	72398	53
8	46874	49030	51314	53738	56320	59079	62040	65231	68690	72463	52
9	46908	49067	51353	53780	56365	59127	62091	65287	68750	72529	51
10	0.46944	49104	51393	53822	56409	59175	62142	65342	68811	72595	50
11	46979	49142	51432	53864	56454	59222	62194	65398	68871	72661	49
12	47014	49179	51471	53905	56498	59270	62245	65453	68932	72727	48
13	47049	49216	51510	53947	56543	59318	62297	65509	68992	72794	47
14	47084	49253	51550	53989	56588	59366	62348	65560	69053	72860	46
15	0.47119	49290	51589	54031	56633	59414	62400	65620	69113	72927	45
16	47154	49327	51629	54073	56677	59462	62451	65676	69174	72993	44
17	47189	49365	51668	54115	56722	59510	62503	65732	69235	73060	43
18	47225	49402	51708	54157	56767	59558	62555	65788	69296	73127	42
19	47260	49439	51748	54199	56812	59606	62607	65844	69357	73194	41
20	0.47295	49477	51787	54240	56857	59654	62659	65900	69418	73261	40
21	47331	49514	51827	54284	56902	59703	62711	65957	69479	73328	39
22	47366	49551	51867	54326	56947	59751	62763	66013	69541	73395	38
23	47402	49589	51906	54368	56990	59800	62815	66069	69602	73462	37
24	47437	49626	51946	54411	57038	59848	62867	66126	69664	73530	36
25	0.47473	49664	51986	54453	57083	59897	62919	66182	69725	73597	35
26	47508	49702	52026	54496	57128	59945	62972	66239	69787	73665	34
27	47544	49739	52066	54538	57174	59994	63024	66296	69849	73733	33
28	47579	49777	52106	54581	57219	60042	63076	66353	69910	73801	32
29	47615	49815	52146	54623	57255	60091	63129	66409	69972	73869	31
30	0.47650	49852	52186	54666	57310	60140	63181	66466	70034	73937	30
31	47686	49890	52226	54708	57356	60189	63234	66523	70097	74005	29
32	47722	49928	52266	54751	57401	60238	63287	66580	70159	74073	28
33	47758	49966	52306	54794	57447	60287	63340	66638	70221	74142	27
34	47793	50004	52346	54837	57493	60336	63392	66695	70284	74210	26
35	0.47829	50042	52387	54880	57539	60385	63445	66752	70346	74279	25
36	47865	50080	52427	54923	57584	60434	63498	66810	70409	74348	24
37	47901	50118	52467	54965	57630	60483	63551	66867	70471	74417	23
38	47937	50156	52508	55008	57676	60533	63605	66925	70534	74486	22
39	47973	50194	52548	55052	57722	60582	63658	66982	70597	74555	21
40	0.48009	50232	52589	55095	57768	60631	63711	67040	70660	74624	20
41	48045	50270	52629	55138	57814	60681	63764	67098	70723	74693	19
42	48081	50308	52670	55181	57860	60730	63818	67156	70786	74763	18
43	48117	50346	52710	55224	57907	60780	63871	67214	70850	74832	17
44	48153	50385	52751	55267	57953	60830	63925	67272	70913	74902	16
45	0.48189	50423	52791	55311	57999	60879	63978	67330	70976	74972	15
46	48226	50461	52832	55354	58046	60929	64032	67388	71040	75042	14
47	48262	50500	52873	55398	58092	60979	64086	67447	71104	75112	13
48	48298	50538	52914	55441	58139	61029	64140	67505	71167	75182	12
49	48334	50576	52955	55484	58185	61079	64194	67563	71231	75252	11
50	0.48371	50615	52995	55528	58232	61129	64248	67622	71295	75323	10
51	48407	50653	53036	55572	58278	61179	64302	67681	71359	75393	9
52	48443	50692	53077	55615	58325	61229	64356	67739	71423	75464	8
53	48480	50731	53118	55659	58372	61279	64410	67798	71488	75534	7
54	48516	50769	53159	55703	58418	61330	64464	67857	71552	75605	6
55	0.48553	50808	53200	55747	58465	61380	64519	67916	71616	75676	5
56	48589	50847	53242	55790	58512	61430	64573	67975	71681	75747	4
57	48626	50885	53283	55834	58559	61481	64627	68034	71746	75819	3
58	48662	50924	53324	55878	58606	61531	64682	68093	71810	75890	2
59	48699	50963	53365	55922	58653	61582	64737	68153	71875	75961	1
60	48736	51002	53406	55966	58700	61632	64791	68212	71940	76033	0
	19°	18°	17°	16°	15°	14°	13°	12°	11°	10°	M.

POLAR DISTANCE.

TABLE XI.

LOGARITHMS of the LATITUDE and POLAR DISTANCE.

	LATITUDE.										
M.	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	
0	0.76033	80567	85644	91411	0.98077	1.05970	1.15642	1.28120	1.45718	1.75814	60
1	76105	80647	85734	91514	98197	06115	15823	28362	46081	76544	59
2	76177	80727	85825	91617	98318	06260	16004	28605	46448	77287	58
3	76248	80807	85915	91720	98439	06406	16187	28849	46817	78042	57
4	76321	80887	86006	91821	98560	06552	16370	29095	47190	78811	56
5	0.76393	80967	86096	91928	0.98682	1.06699	1.16554	1.29342	1.47566	1.79593	55
6	76465	81048	86187	92032	98804	06846	16739	29591	47945	80390	54
7	76538	81129	86278	92137	98926	06993	16925	29841	48327	81202	53
8	76610	81210	86370	92242	99049	07141	17112	30093	48713	82029	52
9	76683	81291	86461	92347	99172	07290	17299	30346	49103	82872	51
10	0.76756	81372	86553	92452	0.99296	1.07439	1.17487	1.30600	1.49495	1.83732	50
11	76829	81453	86645	92558	99419	07589	17676	30856	49892	84609	49
12	76902	81535	86737	92663	99544	07739	17866	31114	50292	85505	48
13	76975	81617	86829	92769	99668	07890	18056	31373	50696	86419	47
14	77048	81698	86922	92876	99793	08041	18248	31633	51104	87353	46
15	0.77122	81780	87015	92982	0.99918	1.08193	1.18440	1.31896	1.51515	1.88307	45
16	77195	81863	87108	93089	1.00044	08345	18633	32159	51931	89283	44
17	77269	81945	87201	93196	00170	08498	18827	32425	52350	90282	43
18	77343	82027	87294	93304	00296	08651	19022	32692	52774	91304	42
19	77417	82110	87388	93411	00423	08805	19218	32961	53201	92350	41
20	0.77491	82193	87481	93519	1.00550	1.08960	1.19415	1.33231	1.53633	1.93422	40
21	77565	82276	87575	93628	00678	09115	19612	33503	54070	94522	39
22	77639	82359	87669	93736	00806	09270	19811	33777	54511	95650	38
23	77714	82442	87764	93845	00934	09426	20010	34053	54956	96808	37
24	77789	82526	87858	93954	01063	09583	20211	34330	55406	97998	36
25	0.77863	82609	87953	94063	1.01192	1.09740	1.20412	1.34609	1.55861	1.99222	35
26	77938	82693	88048	94173	01321	09898	20614	34890	56320	2.00480	34
27	78013	82777	88143	94283	01451	10057	20817	35173	56784	01777	33
28	78088	82861	88239	94393	01581	10216	21021	35457	57254	03113	32
29	78164	82945	88334	94503	01712	10375	21226	35744	57728	04492	31
30	0.78239	83030	88430	94614	1.01843	1.10536	1.21432	1.36032	1.58208	2.05916	30
31	78315	83114	88526	94725	01974	10696	21639	36322	58693	07388	29
32	78390	83199	88623	94836	02106	10858	21848	36615	59184	08912	28
33	78466	83284	88719	94948	02238	11020	22057	36909	59680	10491	27
34	78542	83369	88816	95060	02371	11183	22267	37205	60182	12130	26
35	0.78618	83455	88913	95172	1.02504	1.11346	1.22478	1.37503	1.60690	2.1383[illegible]	25
36	78694	83540	89010	95285	02637	11510	22690	37804	61204	15607	24
37	78771	83626	89107	95397	02771	11674	22903	38106	61724	17455	23
38	78847	83711	89205	95510	02905	11839	23117	38411	62250	19385	22
39	78924	83797	89303	95624	03040	12005	23332	38718	62783	21406	21
40	0.79001	83884	89401	95738	1.03175	1.12171	1.23549	1.39027	1.63322	2.23525	20
41	79078	83970	89499	95851	03311	12339	23766	39338	63868	25752	19
42	79155	84056	89598	95966	03447	12506	23985	39651	64422	28100	18
43	79232	84143	89696	96080	03583	12675	24204	39967	64982	30583	17
44	79309	84230	89795	96195	03720	12844	34425	40285	65550	33216	16
45	0.79387	84317	89894	96310	1.03857	1.13013	1.24647	1.40605	1.66125	2.36018	15
46	79465	84404	89994	96426	03995	13184	24870	40928	66708	39015	14
47	79542	84492	90093	96542	04133	13355	25094	41253	67298	42233	13
48	79620	84579	90193	96658	04272	13526	25320	41581	67897	45709	12
49	79698	84667	99293	96774	04411	13699	25546	41911	68505	49488	11
50	0.79777	84755	90394	96891	1.04550	1.13872	1.25774	1.42243	1.69121	2.53627	10
51	79855	84843	90494	97008	04690	14045	26003	42579	69745	58203	9
52	79933	84931	90595	97126	04830	14220	26233	42916	70379	63318	8
53	80012	85020	90696	97243	04971	14395	26465	43257	71023	69118	7
54	80091	85109	90798	97361	05113	14571	26697	43600	71676	75812	6
55	0.80170	85197	90899	97480	1.05254	1.14748	1.26931	1.43946	1.72339	2.83730	5
56	80249	85286	91001	97598	05397	14925	27166	44295	73012	93421	4
57	80328	85376	91103	97717	05539	15103	27403	44646	73696	3.05915	3
58	80408	85465	91205	97837	05683	15282	27640	45001	74391	23524	2
59	80487	85555	91308	97957	05826	15461	27880	45358	75097	53627	1
60	80567	85644	91411	98077	05970	15642	28120	45718	75814		0
	9°	8°	7°	6°	5°	4°	3°	2°	1°	0°	M.
	POLAR DISTANCE.										

TABLE XII.

LOGARITHMS of the HALF SUM and DIFFERENCE.

	HALF SUM.										
M.	89°	88°	87°	86°	85°	84°	83°	82°	81°	80°	
0	3.24186	3.54282	3.71880	3.84358	3.94030	4.01923	4.08589	14356	19433	23967	60
1	23456	53919	71638	84177	93885	01803	08486	14266	19353	23895	59
2	22713	53552	71395	83996	93740	01682	08383	14175	19273	23823	58
3	21958	53183	71151	83813	93594	01561	08280	14085	19193	23752	57
4	21189	52810	70905	83630	93448	01440	08176	13994	19113	23679	56
5	3.20407	3.52434	3.70658	3.83446	3.93301	4.01318	4.08072	13904	19033	23607	55
6	19610	52055	70409	83261	93154	01196	07968	13813	18952	23535	54
7	18799	51673	70159	83075	93007	01074	07863	13722	18871	23462	53
8	17971	51287	69907	82888	92859	00951	07758	13630	18790	23390	52
9	17128	50897	69654	82701	92710	00823	07653	13539	18709	23317	51
10	3.16268	3.50505	3.69400	3.82512	3.92561	4.00704	4.07548	13447	18628	23244	50
11	15391	50108	69144	82324	92411	00581	07442	13355	18547	23171	49
12	14495	49708	68886	82134	92261	00456	07337	13263	18465	23098	48
13	13581	49304	68627	81944	92110	00332	07231	13171	18383	23025	47
14	12647	48896	68367	81752	91959	00207	07124	13078	18302	22952	46
15	3.11693	3.48485	3.68104	3.81560	3.91807	4.00082	4.07018	12985	18220	22878	45
16	10717	48069	67841	81367	91655	3.99956	06911	12892	18137	22805	44
17	09718	47650	67575	81173	91502	99830	06804	12799	18055	22731	43
18	08696	47226	67308	80978	91349	99704	06696	12706	17973	22657	42
19	07650	46799	67039	80782	91195	99577	06589	12612	17890	22583	41
20	3.06578	3.46367	3.66769	3.80585	3.91040	3.99450	4.06481	12519	17807	22509	40
21	05478	45930	66497	80388	90885	99322	06372	12425	17724	22435	39
22	04350	45489	66223	80189	90730	99194	06264	12331	17641	22361	38
23	03192	45044	65947	79990	90574	99066	06155	12236	17558	22286	37
24	02002	44594	65670	79789	90417	98937	06046	12142	17474	22211	36
25	3.00779	3.44139	3.65391	3.79588	3.90260	3.98808	4.05937	12047	17391	22137	35
26	2.99520	43680	65110	79386	90102	98679	05827	11952	17307	22062	34
27	98223	43216	64827	79183	89943	98549	05717	11857	17223	21987	33
28	96887	42746	64543	78979	89784	98419	05607	11761	17139	21912	32
29	95508	42272	64256	78774	89625	98288	05497	11666	17055	21836	31
30	2.94084	3.41792	3.63968	3.78568	3.89464	3.98157	4.05386	11570	16970	21761	30
31	92612	41307	63678	78361	89304	98026	05275	11474	16886	21685	29
32	91088	40816	63385	78152	89142	97894	05164	11377	16801	21610	28
33	89509	40320	63091	77943	88980	97762	05052	11281	16716	21534	27
34	87870	39818	62795	77733	88817	97629	04940	11184	16631	21458	26
35	2.86166	3.39310	3.62497	3.77522	3.88654	3.97496	4.04828	11087	16545	21382	25
36	84393	38796	62196	77310	88490	97363	04715	10990	16460	21306	24
37	82545	38276	61894	77097	88326	97229	04603	10893	16374	21229	23
38	80615	37750	61589	76883	88161	97095	04490	10795	16289	21153	22
39	78594	37217	61282	76667	87995	96960	04376	10697	16203	21076	21
40	2.76475	3.36678	3.60973	3.76451	3.87829	3.96825	4.04262	10599	16116	20999	20
41	74248	36132	60662	76234	87661	96689	04149	10501	16030	20922	19
42	71900	35578	60349	76015	87494	96553	04034	10402	15944	20845	18
43	69417	35018	60033	75796	87325	96417	03920	10304	15857	20768	17
44	66784	34450	59715	75575	87156	96280	03805	10205	15770	20691	16
45	2.63982	3.33875	3.59395	3.75353	3.86987	3.96143	4.03690	10106	15683	20613	15
46	60985	33292	59072	75130	86816	96005	03574	10006	15596	20535	14
47	57767	32702	58747	74906	86645	95867	03458	09907	15508	20458	13
48	54291	32103	58419	74680	86474	95728	03342	09807	15421	20380	12
49	50512	31495	58089	74454	86301	95589	03226	09707	15333	20302	11
50	2.46373	3.30879	3.57757	3.74226	3.86128	3.95450	4.03109	09606	15245	20223	10
51	41797	30255	57421	73997	85955	95310	02992	09506	15157	20145	9
52	36682	29621	57084	73767	85780	95170	02874	09405	15069	20067	8
53	30882	28927	56743	73535	85605	95029	02757	09304	14980	19988	7
54	24188	28324	56400	73303	85429	94887	02639	09202	14891	19909	6
55	2.16270	3.27661	3.56054	3.73069	3.85252	3.94746	4.02520	09101	14803	19830	5
56	06579	26988	55705	72834	85075	94603	02402	08999	14714	19751	4
57	1.94085	26304	55354	72597	84897	94461	02283	08897	14624	19672	3
58	76476	25609	54999	72360	84718	94317	02163	08795	14535	19592	2
59	46373	24903	54642	72120	84539	94174	02043	08692	14445	19513	1
60	00000	24186	54282	71880	84358	94030	01923	08589	14356	19433	0
	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	M.
	DIFFERENCE.										

TABLE XII.

LOGARITHMS of the HALF SUM and DIFFERENCE.

HALF SUM.

M.	79°	78°	77°	76°	75°	74°	73°	72°	71°	70°	
0	4.28060	31788	35209	38368	41300	44034	46594	48998	51264	53405	60
1	27995	31728	35154	38317	41252	43990	46552	48959	51227	53370	59
2	27930	31669	35099	38266	41205	43946	46511	48920	51191	53336	58
3	27864	31609	35044	38215	41158	43901	46469	48881	51154	53301	57
4	27799	31549	34989	38164	41110	43857	46428	48842	51117	53266	56
5	4.27734	31490	34934	38113	41063	43813	46386	48803	51080	53231	55
6	27668	31430	34879	38062	41016	43769	46345	48764	51043	53196	54
7	27602	31370	34824	38011	40968	43724	46303	48725	51007	53161	53
8	27537	31310	34769	37960	40921	43680	46262	48686	50970	53126	52
9	27471	31250	34713	37909	40873	43635	46220	48647	50933	53092	51
10	4.27405	31189	34658	37858	40825	43591	46178	48607	50896	53056	50
11	27339	31129	34602	37806	40778	43546	46136	48568	50858	53021	49
12	27273	31068	34547	37755	40730	43502	46095	48529	50821	52986	48
13	27206	31008	34491	37703	40682	43457	46053	48490	50784	52951	47
14	27140	30947	34436	37652	40634	43412	46011	48450	50747	52916	46
15	4.27073	30887	34380	37600	40586	43367	45960	48411	50710	52881	45
16	27007	30826	34324	37549	40538	43323	45927	48371	50673	52846	44
17	26940	30765	34268	37497	40490	43278	45885	48332	50635	52811	43
18	26873	30704	34212	37445	40442	43233	45843	48292	50598	52775	42
19	26806	30643	34156	37393	40394	43188	45801	48252	50561	52740	41
20	4.26739	30582	34100	37341	40346	43143	45758	48213	50523	52705	40
21	26672	30521	34043	37289	40297	43098	45716	48173	50486	52669	39
22	26605	30459	33987	37237	40249	43053	45674	48133	50449	52634	38
23	26538	30398	33931	37185	40200	43008	45632	48094	50411	52598	37
24	26470	30336	33874	37133	40152	42962	45589	48054	50374	52563	36
25	4.26403	30275	33818	37081	40103	42917	45547	48014	50336	52527	35
26	26335	30213	33761	37028	40055	42872	45504	47974	50298	52492	34
27	26267	30151	33704	36976	40006	42826	45462	47934	50261	52456	33
28	26199	30090	33647	36924	39958	42781	45419	47894	50223	52421	32
29	26131	30028	33591	36871	39909	42735	45377	47854	50185	52385	31
30	4.26063	29966	33534	36819	39860	42690	45334	47814	50148	52350	30
31	25995	29903	33477	36766	39811	42644	45292	47774	50110	52314	29
32	25927	29841	33420	36713	39762	42599	45249	47734	50072	52278	28
33	25858	29779	33362	36660	39713	42553	45206	47694	50034	52242	27
34	25790	29716	33305	36608	39664	42507	45163	47654	49996	52207	26
35	4.25721	29654	33248	36555	39615	42461	45120	47613	49958	52171	25
36	25652	29591	33190	36502	39566	42416	45077	47573	49920	52135	24
37	25583	29529	33133	36449	39517	42370	45035	47533	49882	52099	23
38	25514	29466	33075	36395	39467	42324	44992	47492	49844	52063	22
39	25445	29403	33018	36342	39418	42278	44948	47452	49806	52027	21
40	4.25376	29340	32960	36289	39369	42232	44905	47411	49768	51991	20
41	25307	29277	32902	36236	39319	42186	44862	47371	49730	51955	19
42	25237	29214	32844	36182	39270	42140	44819	47330	49692	51919	18
43	25168	29150	32786	36129	39220	42093	44776	47290	49654	51883	17
44	25098	29087	32728	36075	39170	42047	44733	47249	49615	51847	16
45	4.25028	29024	32670	36022	39121	42001	44689	47209	49577	51811	15
46	24958	28960	32612	35968	39071	41954	44646	47168	49539	51774	14
47	24888	28896	32553	35914	39021	41908	44602	47127	49500	51738	13
48	24818	28833	32495	35860	38971	41861	44559	47086	49462	51702	12
49	24748	28769	32437	35806	38921	41815	44516	47045	49424	51666	11
50	4.24677	28705	32378	35752	38871	41768	44472	47005	49385	51629	10
51	24607	28641	32319	35698	38821	41722	44428	46964	49347	51593	9
52	24536	28577	32261	35644	38771	41675	44385	46923	49308	51557	8
53	24466	28511	32202	35590	38721	41628	44341	46882	49269	51520	7
54	24395	28448	32143	35536	38670	41582	44297	46841	49231	51484	6
55	4.24321	28384	32084	35481	38620	41535	44253	46800	49192	51447	5
56	24253	28319	32025	35427	38570	41488	44210	46758	49153	51411	4
57	24181	28254	31966	35373	38519	41441	44166	46717	49115	51374	3
58	24110	28190	31907	35318	38469	41394	44122	46676	49076	51338	2
59	24039	28125	31847	35263	38418	41347	44078	46635	49037	51301	1
60	23967	28060	31788	35209	38368	41300	44034	46594	48998	51264	0
	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	M.

DIFFERENCE.

TABLE XII.

LOGARITHMS of the HALF SUM and DIFFERENCE

HALF SUM.

M.	69°	68°	67°	66°	65°	64°	63°	62°	61°	60°	
0	4.55433	57358	59188	60931	62595	64184	65705	67161	68557	69897	60
1	55400	57326	59158	60903	62568	64158	65680	67137	68534	69875	59
2	55367	57295	59128	60875	62541	64132	65655	67113	68512	69853	58
3	55334	57264	59098	60846	62513	64106	65630	67090	68489	69831	57
4	55301	57232	59069	60818	62486	64080	65605	67066	68466	69809	56
5	4.55268	57201	59039	60789	62459	64054	65580	67042	68443	69787	55
6	55235	57169	59009	60761	62432	64028	65556	67018	68420	69765	54
7	55202	57138	58979	60732	62405	64002	65531	66994	68397	69743	53
8	55169	57107	58949	60704	62377	63976	65506	66970	68374	69721	52
9	55136	57075	58919	60675	62350	63950	65481	66946	68351	69699	51
10	4.55102	57044	58889	60646	62323	63924	65456	66922	68328	69677	50
11	55069	57012	58859	60618	62296	63898	65431	66899	68305	69655	49
12	55036	56980	58829	60589	62268	63872	65406	66875	68282	69633	48
13	55003	56949	58799	60561	62241	63846	65381	66851	68260	69611	47
14	54969	56917	58769	60532	62214	63820	65356	66827	68237	69589	46
15	4.54936	56886	58739	60503	62186	63794	65331	66803	68213	69567	45
16	54903	56854	58709	60474	62159	63767	65306	66779	68190	69545	44
17	54869	56822	58678	60446	62131	63741	65281	66755	68167	69523	43
18	54836	56790	58648	60417	62104	63715	65255	66731	68144	69501	42
19	54802	56759	58618	60388	62076	63689	65230	66706	68121	69479	41
20	4.54769	56727	58588	60359	62049	63662	65205	66682	68098	69456	40
21	54735	56695	58557	60331	62021	63636	65180	66658	68075	69434	39
22	54702	56663	58527	60302	61994	63610	65155	66634	68052	69412	38
23	54668	56631	58497	60273	61966	63583	65130	66610	68029	69390	37
24	54635	56599	58467	60244	61939	63557	65104	66586	68006	69368	36
25	4.54601	56568	58436	60215	61911	63531	65079	66562	67982	69345	35
26	54567	56536	58406	60186	61883	63504	65054	66537	67959	69323	34
27	54534	56504	58375	60157	61856	63478	65029	66513	67936	69301	33
28	54500	56472	58345	60128	61828	63451	65003	66489	67913	69279	32
29	54466	56440	58314	60099	61800	63425	64978	66465	67890	69256	31
30	4.54433	56408	58284	60070	61773	63398	64953	66441	67866	69234	30
31	54399	56375	58253	60041	61745	63372	64927	66416	67843	69212	29
32	54365	56343	58223	60012	61717	63345	64902	66392	67820	69189	28
33	54331	56311	58192	59983	61689	63319	64877	66368	67796	69167	27
34	54297	56279	58162	59954	61662	63292	64851	66343	67773	69144	26
35	4.54263	56247	58131	59924	61634	63266	64826	66319	67750	69122	25
36	54229	56215	58101	59895	61606	63239	64800	66295	67726	69100	24
37	54195	56182	58070	59866	61578	63213	64775	66270	67703	69077	23
38	54161	56150	58039	59837	61550	63186	64749	66246	67680	69055	22
39	54127	56118	58008	59808	61522	63159	64724	66221	67656	69032	21
40	4.54093	56085	57978	59778	61494	63133	64698	66197	67633	69010	20
41	54059	56053	57947	59749	61466	63106	64673	66173	67609	68987	19
42	54025	56021	57916	59720	61438	63079	64647	66148	67586	68965	18
43	53991	55988	57885	59690	61410	63052	64622	66124	67562	68942	17
44	53957	55956	57855	59661	61382	63026	64596	66099	67539	68920	16
45	4.53922	55923	57824	59632	61354	62999	64571	66075	67515	68897	15
46	53888	55891	57793	59602	61326	62972	64545	66050	67492	68875	14
47	53854	55858	57762	59573	61298	62945	64519	66025	67468	68852	13
48	53819	55826	57731	59543	61270	62918	64494	66001	67445	68829	12
49	53785	55793	57700	59514	61242	62892	64468	65976	67421	68807	11
50	4.53751	55761	57669	59484	61214	62865	64442	65952	67398	68784	10
51	53716	55728	57638	59455	61186	62838	64417	65927	67374	68762	9
52	53682	55695	57607	59425	61158	62811	64391	65902	67350	68739	8
53	53647	55663	57576	59396	61129	62784	64365	65878	67327	68716	7
54	53613	55630	57545	59366	61101	62757	64339	65853	67303	68694	6
55	4.53578	55597	57514	59336	61073	62730	64313	65828	67280	68671	5
56	53544	55564	57482	59307	61045	62703	64288	65804	67256	68648	4
57	53509	55532	57451	59277	61016	62676	64262	65779	67232	68625	3
58	53475	55499	57420	59247	60988	62649	64236	65754	67208	68603	2
59	53440	55466	57389	59218	60960	62622	64210	65729	67185	68580	1
60	53405	55433	57358	59188	60931	62595	64184	65705	67161	68557	0
	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	M.

DIFFERENCE.

TABLE XII.

LOGARITHMS of the HALF SUM and DIFFERENCE.

HALF SUM.

M.	59°	58°	57°	56°	55°	54°	53°	52°	51°	59°	
0	4.71184	72421	73611	74756	75859	76922	77946	78934	79887	80807	60
1	71163	72401	73591	74737	75841	76904	77930	78918	79872	80792	59
2	71142	72381	73572	74719	75823	76887	77913	78902	79856	80777	58
3	71121	72360	73552	74700	75805	76870	77896	78886	79840	80762	57
4	71100	72340	73533	74681	75787	76852	77879	78869	79825	80746	56
5	4.71079	72320	73513	74662	75769	76835	77862	78853	79809	80731	55
6	71058	72299	73494	74644	75751	76817	77846	78837	79793	80716	54
7	71036	72279	73474	74625	75733	76800	77829	78821	79778	80701	53
8	71015	72259	73455	74606	75714	76782	77812	78805	79762	80686	52
9	70994	72238	73435	74587	75696	76765	77795	78788	79746	80671	51
10	4.70973	72218	73416	74568	75678	76747	77778	78772	79731	80656	50
11	70952	72198	73396	74549	75660	76730	77761	78756	79715	80641	49
12	70931	72177	73377	74531	75642	76712	77744	78739	79699	80625	48
13	70909	72157	73357	74512	75624	76695	77727	78723	79684	80610	47
14	70888	72137	73337	74493	75605	76677	77711	78707	79668	80595	46
15	4.70867	72116	73318	74474	75587	76660	77694	78691	79652	80580	45
16	70846	72096	73298	74455	75569	76642	77677	78674	79636	80565	44
17	70824	72075	73278	74436	75551	76625	77660	78658	79621	80550	43
18	70803	72055	73259	74417	75533	76607	77643	78642	79605	80534	42
19	70782	72034	73239	74398	75514	76590	77626	78625	79589	80519	41
20	4.70761	72014	73219	74379	75496	76572	77609	78609	79573	80504	40
21	70739	71994	73200	74360	75478	76554	77592	78592	79558	80489	39
22	70718	71973	73180	74341	75459	76537	77575	78576	79542	80473	38
23	70697	71952	73160	74322	75441	76519	77558	78560	79526	80458	37
24	70675	71932	73140	74303	75423	76501	77541	78543	79510	80443	36
25	4.70654	71911	73121	74284	75405	76484	77524	78527	79494	80428	35
26	70633	71891	73101	74265	75386	76466	77507	78510	79478	80412	34
27	70611	71870	73081	74246	75368	76448	77490	78494	79463	80397	33
28	70590	71850	73061	74227	75350	76431	77473	78478	79447	80382	32
29	70568	71829	73041	74208	75331	76413	77456	78461	79431	80366	31
30	4.70547	71809	73022	74189	75313	76395	77439	78445	79415	80351	30
31	70525	71788	73002	74170	75294	76378	77422	78428	79399	80336	29
32	70504	71767	72982	74151	75276	76360	77405	78412	79383	80320	28
33	70482	71747	72962	74132	75258	76342	77387	78395	79367	80305	27
34	70461	71726	72942	74113	75239	76324	77370	78379	79351	80290	26
35	4.70439	71705	72922	74093	75221	76307	77353	78362	79335	80274	25
36	70418	71685	72902	74074	75202	76289	77336	78346	79319	80259	24
37	70396	71664	72883	74055	75184	76271	77319	78329	79304	80244	23
38	70375	71643	72863	74036	75165	76253	77302	78313	79288	80228	22
39	70353	71622	72843	74017	75147	76236	77285	78296	79272	80213	21
40	4.70332	71602	72823	73997	75128	76218	77268	78280	79256	80197	20
41	70310	71581	72803	73978	75110	76200	77250	78263	79240	80182	19
42	70288	71560	72783	73959	75091	76182	77233	78246	79224	80166	18
43	70267	71539	72763	73940	75073	76164	77216	78230	79208	80151	17
44	70245	71519	72743	73921	75054	76146	77199	78213	79192	80136	16
45	4.70224	71498	72723	73901	75036	76129	77181	78197	79176	80120	15
46	70202	71477	72703	73882	75017	76111	77164	78180	79160	80105	14
47	70180	71456	72683	73863	74999	76093	77147	78163	79144	80089	13
48	70159	71435	72663	73843	74980	76075	77130	78147	79128	80074	12
49	70137	71414	72643	73824	74961	76057	77112	78130	79111	80058	11
50	4.70115	71393	72622	73805	74943	76039	77095	78113	79095	80043	10
51	70093	71373	72602	73785	74924	76021	77078	78097	79079	80027	9
52	70072	71352	72582	73766	74906	76003	77061	78080	79063	80012	8
53	70050	71331	72562	73747	74887	75985	77043	78063	79047	79996	7
54	70028	71310	72542	73727	74868	75967	77026	78047	79031	79981	6
55	4.70006	71289	72522	73708	74850	75949	77009	78030	79015	79965	5
56	69984	71268	72502	73689	74831	75931	76991	78013	78999	79950	4
57	69963	71247	72482	73669	74812	75913	76974	77997	78983	79934	3
58	69941	71226	72461	73650	74794	75895	76957	77980	78967	79918	2
59	69919	71205	72441	73630	74775	75877	76939	77963	78950	79903	1
60	69897	71184	72421	73611	74756	75859	76922	77946	78934	79887	0
	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	M.

DIFFERENCE.

TABLE XII.

Logarithms of the Half Sum and Difference.

HALF SUM.

M.	49°	48°	47°	46°	45°	44°	43°	42°	41°	40°	
0	4.81694	82551	83378	84177	84949	85693	86413	87107	87778	88425	60
1	81680	82537	83365	84164	84936	85681	86401	87096	87767	88415	59
2	81665	82523	83351	84151	84923	85669	86389	87085	87756	88404	58
3	81651	82509	83338	84138	84911	85657	86377	87073	87745	88394	57
4	81636	82495	83324	84125	84898	85645	86366	87062	87734	88383	56
5	4.81622	82481	83311	84112	84885	85632	86354	87050	87723	88372	55
6	81607	82467	83297	84099	84873	85620	86342	87039	87712	88362	54
7	81592	82453	83283	84085	84860	85608	86330	87028	87701	88351	53
8	81578	82439	83270	84072	84847	85596	86318	87016	87690	88340	52
9	81563	82424	83256	84059	84835	85583	86306	87005	87679	88330	51
10	4.81549	82410	83242	84046	84822	85571	86295	86993	87668	88319	50
11	81534	82396	83229	84033	84809	85559	86283	86982	87657	88308	49
12	81519	82382	83215	84020	84796	85547	86271	86970	87646	88298	48
13	81505	82368	83202	84006	84784	85534	86259	86959	87635	88287	47
14	81490	82354	83188	83993	84771	85522	86247	86947	87624	88276	46
15	4.81475	82340	83174	83980	84758	85510	86235	86936	87613	88266	45
16	81461	82326	83161	83967	84745	85497	86223	86924	87601	88255	44
17	81446	82311	83147	83954	84733	85485	86211	86913	87590	88244	43
18	81431	82297	83133	83940	84720	85473	86200	86902	87579	88234	42
19	81417	82283	83120	83927	84707	85460	86188	86890	87568	88223	41
20	4.81402	82269	83106	83914	84694	85448	86176	86879	87557	88212	40
21	81387	82255	83092	83901	84682	85436	86164	86867	87546	88201	39
22	81372	82240	83078	83887	84669	85423	86152	86855	87535	88191	38
23	81358	82226	83065	83874	84656	85411	86140	86844	87524	88180	37
24	81343	82212	83051	83861	84643	85399	86128	86832	87513	88169	36
25	4.81328	82198	83037	83848	84630	85386	86116	86821	87501	88158	35
26	81314	82184	83023	83834	84618	85374	86104	86809	87490	88148	34
27	81299	82169	83010	83821	84605	85361	86092	86798	87479	88137	33
28	81284	82155	82996	83808	84592	85349	86080	86786	87468	88126	32
29	81269	82141	82982	83795	84579	85337	86068	86775	87457	88115	31
30	4.81254	82126	82968	83781	84566	85324	86056	86763	87446	88105	30
31	81240	82112	82955	83768	84553	85312	86044	86752	87434	88094	29
32	81225	82098	82941	83755	84540	85299	86032	86740	87423	88083	28
33	81210	82084	82927	83741	84528	85287	86020	86728	87412	88072	27
34	81195	82069	82913	83728	84515	85274	86008	86717	87401	88061	26
35	4.81180	82055	82899	83715	84502	85262	85996	86705	87390	88051	25
36	81166	82041	82885	83701	84489	85250	85984	86694	87378	88040	24
37	81151	82026	82872	83688	84476	85237	85972	86682	87367	88029	23
38	81136	82012	82858	83674	84463	85225	85960	86670	87356	88018	22
39	81121	81998	82844	83661	84450	85212	85948	86659	87345	88007	21
40	4.81106	81983	82830	83648	84437	85200	85936	86647	87334	87996	20
41	81091	81969	82816	83634	84424	85187	85924	86635	87322	87985	19
42	81076	81955	82802	83621	84411	85175	85912	86624	87311	87975	18
43	81061	81940	82788	83608	84398	85162	85900	86612	87300	87964	17
44	81047	81926	82775	83594	84385	85150	85888	86600	87288	87953	16
45	4.81032	81911	82761	83581	84373	85137	85876	86589	87277	87942	15
46	81017	81897	82747	83567	84360	85125	85864	86577	87266	87931	14
47	81002	81882	82733	83554	84347	85112	85851	86565	87255	87920	13
48	80987	81868	82719	83540	84334	85100	85839	86554	87243	87909	12
49	80972	81854	82705	83527	84321	85087	85827	86542	87232	87898	11
50	4.80957	81839	82691	83513	84308	85074	85815	86530	87221	87887	10
51	80942	81825	82677	83500	84295	85062	85803	86518	87209	87877	9
52	80927	81810	82663	83486	84282	85049	85791	86507	87198	87866	8
53	80912	81796	82649	83473	84269	85037	85779	86495	87187	87855	7
54	80897	81781	82635	83459	84255	85024	85766	86483	87175	87844	6
55	4.80882	81767	82621	83446	84242	85012	85754	86472	87164	87833	5
56	80867	81752	82607	83432	84229	84999	85742	86460	87153	87822	4
57	80852	81738	82593	83419	84216	84986	85730	86448	87141	87811	3
58	80837	81723	82579	83405	84203	84974	85718	86436	87130	87800	2
59	80822	81709	82565	83392	84190	84961	85706	86425	87119	87789	1
60	80807	81694	82551	83378	84177	84949	85693	86413	87107	87778	0
	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	M.

DIFFERENCE.

TABLE XII.

LOGARITHMS of the HALF SUM and DIFFERENCE.

	HALF SUM.										
M.	39°	38°	37°	36°	35°	34°	33°	32°	31°	30°	
0	4.89050	89653	90235	90796	91336	91857	92359	92842	93307	93753	60
1	89040	89643	90225	90787	91328	91849	92351	92834	93299	93746	59
2	89030	89633	90216	90777	91319	91840	92343	92826	93291	93738	58
3	89020	89624	90206	90768	91310	91832	92334	92818	93284	93731	57
4	89009	89614	90197	90759	91301	91823	92326	92810	93276	93724	56
5	4.88999	89604	90187	90750	91292	91815	92318	92803	93269	93717	55
6	88989	89594	90178	90741	91283	91806	92310	92795	93261	93709	54
7	88978	89584	90168	90731	91274	91798	92302	92787	93253	93702	53
8	88968	89574	90159	90722	91266	91789	92293	92779	93246	93695	52
9	88958	89564	90149	90713	91257	91781	92285	92771	93238	93687	51
10	4.88948	89554	90139	90704	91248	91772	92277	92763	93230	93680	50
11	88937	89544	90130	90694	91239	91763	92269	92755	93223	93673	49
12	88927	89534	90120	90685	91230	91755	92260	92747	93215	93665	48
13	88917	89524	90111	90676	91221	91746	92252	92739	93207	93658	47
14	88906	89514	90101	90667	91212	91738	92244	92731	93200	93650	46
15	4.88896	89504	90091	90657	91203	91729	92235	92723	93192	93643	45
16	88886	89495	90082	90648	91194	91720	92227	92715	93184	93636	44
17	88875	89485	90072	90639	91185	91712	92219	92707	93177	93628	43
18	88865	89475	90063	90630	91176	91703	92211	92699	93169	93621	42
19	88855	89465	90053	90620	91167	91695	92202	92691	93161	93614	41
20	4.88844	89455	90043	90611	91158	91686	92194	92683	93154	93606	40
21	88834	89445	90034	90602	91149	91677	92186	92675	93146	93599	39
22	88824	89435	90024	90592	91141	91669	92177	92667	93138	93591	38
23	88813	89425	90014	90583	91132	91660	92169	92659	93131	93584	37
24	88803	89415	90005	90574	91123	91651	92161	92651	93123	93577	36
25	4.88793	89405	89995	90565	91114	91643	92152	92643	93115	93569	35
26	88782	89395	89985	90555	91105	91634	92144	92635	93108	93562	34
27	88772	89385	89976	90546	91096	91625	92136	92627	93100	93554	33
28	88761	89375	89966	90537	91087	91617	92127	92619	93092	93547	32
29	88751	89364	89956	99527	91078	91608	92119	92611	93084	93539	31
30	4.88741	89354	89947	90518	91069	91599	92111	92603	93077	93532	30
31	88730	89344	89937	90509	91060	91591	92102	92595	93069	93525	29
32	88720	89334	89927	90499	91051	91582	92094	92587	93061	93517	28
33	88709	89324	89918	90490	91042	91573	92086	92579	93053	93510	27
34	88699	89314	89908	90480	91033	91565	92077	92571	93046	93502	26
35	4.88688	89304	89898	90471	91023	91556	92069	92563	93038	93495	25
36	88678	89294	89888	90462	91014	91547	92060	92555	93030	93487	24
37	88668	89284	89879	90452	90905	91538	92052	92546	93022	93480	23
38	88657	89274	89869	90443	90996	91530	92044	92538	93014	93472	22
39	88647	89264	89859	90434	90987	91521	92035	92530	93007	93465	21
40	4.88636	89254	89849	90424	90978	91512	92027	92522	92999	93457	20
41	88626	89244	89840	90415	90969	91504	92018	92514	92991	93450	19
42	88615	89233	89830	90405	90960	91495	92010	92506	92983	93442	18
43	88605	89223	89820	90396	90951	91486	92002	92498	92976	93435	17
44	88594	89213	89810	90386	90942	91477	91993	92490	92968	93427	16
45	4.88584	89203	89801	90377	90933	91469	91985	92482	92960	93420	15
46	88573	89193	89791	90368	90924	91460	91976	92473	92952	93412	14
47	88563	89183	89781	90358	90915	91451	91968	92465	92944	93405	13
48	88552	89173	89771	90349	90906	91442	91959	92457	92936	93397	12
49	88542	89162	89761	90339	90896	91433	91951	92449	92929	93390	11
50	4.88531	89152	89752	90330	90887	91425	91942	92441	92921	93382	10
51	88521	89142	89742	90320	90878	91416	91934	92433	92913	93375	9
52	88510	89132	89732	90311	90869	91407	91925	92425	92905	93367	8
53	88499	89122	89722	90301	90860	91398	91917	92416	92897	93360	7
54	88489	89112	89712	90292	90851	91389	91908	92408	92889	93352	6
55	4.88478	89101	89702	90282	90842	91381	91900	92400	92881	93344	5
56	88468	89091	89693	90273	90832	91372	91891	92392	92874	93337	4
57	88457	89081	89683	90263	90823	91363	91883	92384	92866	93329	3
58	88447	89071	89673	90254	90814	91354	91874	92376	92858	93322	2
59	88436	89060	89663	90244	90805	91345	91866	92367	92850	93314	1
60	88425	89050	89653	90235	90796	91336	91857	92359	92842	93307	0
	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	M.
	DIFFERENCE.										

TABLE XII.

Logarithms of the Half Sum and Difference.

HALF SUM.

M.	29°	28°	27°	26°	25°	24°	23°	22°	21°	20°	
0	4.94182	94593	94988	95366	95728	96073	96403	96717	97015	97299	60
1	94175	94587	94982	95360	95722	96067	96397	96711	97010	97294	59
2	94168	94580	94975	95354	95716	96062	96392	96706	97005	97289	58
3	94161	94573	94969	95348	95710	96056	96387	96701	97001	97285	57
4	94154	94567	94962	95341	95704	96050	96381	96696	96996	97280	56
5	4.94147	94560	94956	95335	95698	96045	96376	96691	96991	97276	55
6	94140	94553	94949	95329	95692	96039	96370	96686	96986	97271	54
7	94133	94546	94943	95323	95686	96034	96365	96681	96981	97266	53
8	94126	94540	94936	95317	95680	96028	96360	96676	96976	97262	52
9	94119	94533	94930	95310	95674	96022	96354	96670	96971	97257	51
10	4.94112	94526	94923	95304	95668	96017	96349	96665	96966	97252	50
11	94105	94519	94917	95298	95663	96011	96343	96660	96962	97248	49
12	94098	94513	94911	95292	95657	96005	96338	96655	96957	97243	48
13	94090	94506	94904	95286	95651	96000	96333	96650	96952	97238	47
14	94083	94499	94898	95279	95645	95994	96327	96645	96947	97234	46
15	4.94076	94492	94891	95273	95639	95988	96322	96640	96942	97229	45
16	94069	94485	94884	95267	95633	95982	96316	96634	96937	97224	44
17	94062	94479	94878	95261	95627	95977	96311	96629	96932	97220	43
18	94055	94472	94871	95254	95621	95971	96305	96624	96927	97215	42
19	94048	94465	94865	95248	95615	95965	96300	96619	96922	97210	41
20	4.94041	94458	94858	95242	95609	95960	96294	96614	96917	97206	40
21	94034	94451	94852	95236	95603	95954	96289	96608	96912	97201	39
22	94027	94445	94845	95229	95597	95948	96284	96603	96907	97196	38
23	94020	94438	94839	95223	95591	95942	96278	96598	96903	97192	37
24	94012	94431	94832	95217	95585	95937	96273	96593	96898	97187	36
25	4.94005	94424	94826	95211	95579	95931	96267	96588	96893	97182	35
26	93998	94417	94819	95204	95573	95925	96262	96582	96888	97178	34
27	93991	94410	94813	95198	95567	95920	96256	96577	96883	97173	33
28	93984	94404	94806	95192	95561	95914	96251	96572	96878	97168	32
29	93977	94397	94799	95185	95555	95908	96245	96567	96873	97163	31
30	4.93970	94390	94793	95179	95549	95902	96240	96562	96868	97159	30
31	93963	94383	94786	95173	95543	95897	96234	96556	96863	97154	29
32	93955	94376	94780	95167	95537	95891	96229	96551	96858	97149	28
33	93948	94369	94773	95160	95531	95885	96223	96546	96853	97145	27
34	93941	94362	94767	95154	95525	95879	96218	96541	96848	97140	26
35	4.93934	94355	94760	95148	95519	95873	96212	96535	96843	97135	25
36	93927	94349	94753	95141	95513	95868	96207	96530	96838	97130	24
37	93920	94342	94747	95135	95507	95862	96201	96525	96833	97126	23
38	93912	94335	94740	95129	95500	95856	96196	96520	96828	97121	22
39	93905	94328	94734	95122	95494	95850	96190	96514	96823	97116	21
40	4.93898	94321	94727	95116	95488	95844	96185	96509	96818	97111	20
41	93891	94314	94720	95110	95482	95839	96179	96504	96813	97107	19
42	93884	94307	94714	95103	95476	95833	96174	96498	96808	97102	18
43	93876	94300	94707	95097	95470	95827	96168	96493	96803	97097	17
44	93869	94293	94700	95090	95464	95821	96162	96488	96798	97092	16
45	4.93862	94286	94694	95084	95458	95815	96157	96483	96793	97087	15
46	93855	94279	94687	95078	95452	95810	96151	96477	96788	97083	14
47	93847	94273	94680	95071	95446	95804	96146	96472	96783	97078	13
48	93840	94266	94674	95065	95440	95798	96140	96467	96778	97073	12
49	93833	94259	94667	95059	95434	95792	96135	96461	96772	97068	11
50	4.93826	94252	94660	95052	95427	95786	96129	96456	96767	97063	10
51	93819	94245	94654	95046	95421	95780	96123	96451	96762	97059	9
52	93811	94238	94647	95039	95415	95775	96118	96445	96757	97054	8
53	93804	94231	94640	95033	95409	95769	96112	96440	96752	97049	7
54	93797	94224	94634	95027	95403	95763	96107	96435	96747	97044	6
55	4.93789	94217	94627	95020	95397	95757	96101	96429	96742	97039	5
56	93782	94210	94620	95014	95391	95751	96095	96424	96737	97035	4
57	93775	94203	94614	95007	95384	95745	96090	96419	96732	97030	3
58	93768	94196	94607	95001	95378	95739	96084	96413	96727	97025	2
59	93760	94189	94600	94995	95372	95733	96079	96408	96722	97020	1
60	93753	94182	94593	94988	95366	95728	96073	96403	96717	97015	0
	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	M.

DIFFERENCE.

TABLE XII.

LOGARITHMS of the HALF SUM and DIFFERENCE.

HALF SUM.

M.	19°	18°	17°	16°	15°	14°	13°	12°	11°	10°	
0	4.97567	97821	98060	98284	98494	98690	98872	99040	99195	99335	60
1	97563	97817	98056	98281	98491	98687	98869	99038	99192	99333	59
2	97558	97812	98052	98277	98488	98684	98867	99035	99190	99331	58
3	97554	97808	98048	98273	98434	98681	98864	99032	99187	99328	57
4	97550	97804	98044	98270	98481	98678	98861	99030	99185	99326	56
5	4.97545	97800	98040	98266	98477	98675	98858	99027	99182	99324	55
6	97541	97796	98036	98262	98474	98671	98855	99024	99180	99322	54
7	97536	97792	98032	98259	98471	98668	98852	99022	99177	99319	53
8	97532	97788	98029	98255	98467	98665	98849	99019	99175	99317	52
9	97528	97784	98025	98251	98464	98662	98846	99016	99172	99315	51
10	4.97523	97779	98021	98248	98460	98659	98843	99013	99170	99313	50
11	97519	97775	98017	98244	98457	98656	98840	99011	99167	99310	49
12	97515	97771	98013	98240	98453	98652	98837	99008	99165	99308	48
13	97510	97767	98009	98237	98450	98649	98834	99005	99162	99306	47
14	97506	97763	98005	98233	98447	98646	98831	99002	99160	99304	46
15	4.97501	97759	98001	98229	98443	98643	98828	99000	99157	99301	45
16	97497	97754	97997	98226	98440	98640	98825	98997	99155	99299	44
17	97492	97750	97993	98222	98436	98636	98822	98994	99152	99297	43
18	97488	97746	97989	98218	98433	98633	98819	98991	99150	99294	42
19	97484	97742	97986	98215	98429	98630	98816	98989	99147	99292	41
20	4.97479	97738	97982	98211	98426	98627	98813	98986	99145	99290	40
21	97475	97734	97978	98207	98422	98623	98810	98983	99142	99288	39
22	97470	97729	97974	98204	98419	98620	98807	98980	99140	99285	38
23	97466	97725	97970	98200	98415	98617	98804	98978	99137	99283	37
24	97461	97721	97966	98196	98412	98614	98801	98975	99135	99281	36
25	4.97457	97717	97962	98192	98409	98610	98798	98972	99132	99278	35
26	97453	97713	97958	98189	98405	98607	98795	98969	99130	99276	34
27	97448	97708	97954	98185	98402	98604	98792	98967	99127	99274	33
28	97444	97704	97950	98181	98398	98601	98789	98964	99124	99271	32
29	97439	97700	97946	98177	98395	98597	98786	98961	99122	99269	31
30	4.97435	97696	97942	98174	98391	98594	98783	98958	99119	99267	30
31	97430	97691	97938	98170	98388	98591	98780	98955	99117	99264	29
32	97426	97687	97934	98166	98384	98588	98777	98953	99114	99262	28
33	97421	97683	97930	98162	98381	98584	98774	98950	99112	99260	27
34	97417	97679	97926	98159	98377	98581	98771	98947	99109	99257	26
35	4.97412	97674	97922	98155	98373	98578	98768	98944	99106	99255	25
36	97408	97670	97918	98151	98370	98574	98765	98941	99104	99252	24
37	97403	97666	97914	98147	98366	98571	98762	98938	99101	99250	23
38	97399	97662	97910	98144	98363	98568	98759	98936	99099	99248	22
39	97394	97657	97906	98140	98359	98565	98756	98933	99096	99245	21
40	4.97390	97653	97902	98136	98356	98561	98753	98930	99093	99243	20
41	97385	97649	97898	98132	98352	98558	98750	98927	99091	99241	19
42	97381	97645	97894	98129	98349	98555	98746	98924	99088	99238	18
43	97376	97640	97890	98125	98345	98551	98743	98921	99086	99236	17
44	97372	97636	97886	98121	98342	98548	98740	98919	99083	99233	16
45	4.97367	97632	97882	98117	98338	98545	98737	98916	99080	99231	15
46	97363	97627	97878	98113	98334	98541	98734	98913	99078	99229	14
47	97358	97623	97874	98110	98331	98538	98731	98910	99075	99226	13
48	97353	97619	97870	98106	98327	98535	98728	98907	99072	99224	12
49	97349	97615	97866	98102	98324	98531	98725	98904	99070	99221	11
50	4.97344	97610	97861	98098	98320	98528	98722	98901	99067	99219	10
51	97340	97606	97857	98094	98317	98525	98719	98898	99064	99217	9
52	97335	97602	97853	98090	98313	98521	98715	98896	99062	99214	8
53	97331	97597	97849	98087	98309	98518	98712	98893	99059	99212	7
54	97326	97593	97845	98083	98306	98515	98709	98890	99056	99209	6
55	4.97322	.97589	97841	98079	98302	98511	98706	98887	99054	99207	5
56	.97317	97584	97837	98075	98299	98508	98703	98884	99051	99204	4
57	97312	97580	97833	98071	98295	98505	98700	98881	99048	99202	3
58	97308	97576	97829	98067	98291	98501	98697	98878	99046	99200	2
59	97303	97571	97825	98063	98288	98498	98694	98875	99043	99197	1
60	97299	97567	97821	98060	98284	98494	98690	98872	99040	99195	0
	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	M.

DIFFERENCE.

TABLE XII.

LOGARITHMS of the HALF SUM and DIFFERENCE.

	HALF SUM.										
M.	9°	8°	7°	6°	5°	4°	3°	2°	1°	0°	
0	4.99462	99575	99675	99761	99834	99894	99940	99974	99993	00000	60
1	99460	99573	99674	99760	99833	99893	99940	99973	99993	00000	59
2	99458	99572	99672	99759	99832	99892	99939	99973	99993	00000	58
3	99456	99570	99670	99757	99831	99891	99938	99972	99993	00000	57
4	99454	99568	99669	99756	99830	99891	99938	99972	99992	00000	56
5	4.99452	99566	99667	99755	99829	99890	99937	99971	99992	00000	55
6	99450	99565	99666	99753	99828	99889	99936	99971	99992	00000	54
7	99448	99563	99664	99252	99827	99888	99936	99970	99992	00000	53
8	99446	99561	99663	99751	99825	99887	99935	99970	99992	00000	52
9	99444	99559	99661	99749	99824	99886	99934	99969	99991	00000	51
10	4.99442	99557	99659	99748	99823	99885	99934	99969	99991	00000	50
11	99440	99556	99658	99747	99822	99884	99933	99968	99991	00000	49
12	99438	99554	99656	99745	99821	99883	99932	99968	99990	00000	48
13	99436	99552	99655	99744	99820	99882	99932	99967	99990	00000	47
14	99434	99550	99653	99742	99819	99881	99931	99967	99990	00000	46
15	4.99432	99548	99651	99741	99817	99880	99930	99967	99990	00000	45
16	99429	99546	99650	99740	99816	99879	99929	99966	99989	00000	44
17	99427	99545	99648	99738	99815	99879	99929	99966	99989	99999	43
18	99425	99543	99647	99737	99814	99878	99928	99965	99989	99999	42
19	99423	99541	99645	99736	99813	99877	99927	99964	99989	99999	41
20	4.99421	99539	99613	99734	99812	99876	99926	99964	99988	99999	40
21	99419	99537	99642	99733	99810	99875	99926	99963	99988	99999	39
22	99417	99535	99640	99731	99809	99874	99925	99963	99988	99999	38
23	99415	99533	99638	99730	99808	99873	99924	99962	99987	99999	37
24	99413	99532	99637	99728	99807	99872	99923	99962	99987	99999	36
25	4.99411	99530	99635	99727	99806	99871	99923	99961	99987	99999	35
26	99409	99528	99633	99726	99804	99870	99922	99961	99986	99999	34
27	99407	99526	99632	99724	99803	99869	99921	99960	99986	99999	33
28	99404	99524	99630	99723	99802	99868	99920	99960	99986	99999	32
29	99402	99522	99629	99721	99801	99867	99920	99959	99985	99998	31
30	4.99400	99520	99627	99720	99800	99866	99919	99959	99985	99998	30
31	99398	99518	99625	99718	99798	99865	99918	99958	99985	99998	29
32	99396	99517	99624	99717	99797	99864	99917	99958	99984	99998	28
33	99394	99515	99622	99716	99796	99863	99917	99957	99984	99998	27
34	99392	99513	99620	99714	99795	99862	99916	99956	99984	99998	26
35	4.99390	99511	99618	99713	99793	99861	99915	99956	99983	99998	25
36	99388	99509	99617	99711	99792	99860	99914	99955	99983	99998	24
37	99385	99507	99615	99710	99791	99859	99913	99955	99983	99997	23
38	99383	99505	99613	99708	99790	99858	99913	99954	99982	99997	22
39	99381	99503	99612	99707	99788	99857	99912	99954	99982	99997	21
40	4.99379	99501	99610	99705	99787	99856	99911	99953	99982	99997	20
41	99377	99499	99608	99704	99786	99855	99910	99952	99981	99997	19
42	99375	99497	99607	99702	99785	99854	99909	99952	99981	99997	18
43	99372	99495	99605	99701	99783	99853	99909	99951	99981	99997	17
44	99370	99494	99603	99699	99782	99852	99908	99951	99980	99996	16
45	4.99368	99492	99601	99698	99781	99851	99907	99950	99980	99996	15
46	99366	99490	99600	99696	99780	99850	99906	99949	99979	99996	14
47	99364	99488	99598	99695	99778	99848	99905	99949	99979	99996	13
48	99362	99486	99596	99693	99777	99847	99904	99948	99979	99996	12
49	99359	99484	99595	99692	99776	99846	99904	99948	99978	99996	11
50	4.99357	99482	99593	99690	99775	99845	99903	99947	99978	99995	10
51	99355	99480	99591	99689	99773	99844	99902	99946	99977	99995	9
52	99353	99478	99589	99687	99772	99843	99901	99946	99977	99995	8
53	99351	99476	99588	99686	99771	99842	99900	99945	99977	99995	7
54	99348	99474	99586	99684	99769	99841	99899	99944	99976	99995	6
55	4.99346	99472	99584	99683	99768	99840	99898	99944	99976	99994	5
56	99344	99470	99582	99681	99767	99839	99898	99943	99975	99994	4
57	99342	99468	99581	99680	99765	99838	99897	99942	99975	99994	3
58	99340	99466	99579	99678	99764	99837	99896	99942	99974	99994	2
59	99337	99464	99577	99677	99763	99836	99895	99941	99974	99994	1
60	99335	99462	99575	99675	99761	99834	99894	99940	99974	99993	0
	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	M.
	DIFFERENCE.										

TABLE XIII.

Logarithms of the Apparent Time, or Horary Angle.

	0 HOURS								PROPORTIONAL PARTS FOR SECONDS.								
M.	s. 0	s. 10	s. 20	s. 30	s. 40	s. 50	s. 60		s. 1	s. 2	s. 3	s. 4	s. 5	s. 6	s. 7	s. 8	s. 9
0	$^{3}_{4}$.	12127	72333	97551	32539	51921	67757	59									
1	$^{4}_{5}$.67757	81147	92745	02976	12127	20406	27963	58									
2	5.27963	34916	41352	46345	52951	58216	63181	57									
3	63181	67877	72332	76570	80611	84472	88168	56									
4	$^{5}_{6}$.88168	91714	95121	98399	01557	04605	07550	55									
5	6.07550	10398	13155	15828	18421	20938	23385	54									
6	23385	25765	28081	30337	32536	34681	36774	53									
7	36774	38817	40814	42766	44675	46543	48372	52									
8	48372	50162	51916	53636	55323	56977	58600	51									
9	58600	60194	61759	63296	64806	66291	67751	50									
10	6.67751	69186	70598	71988	73355	74702	76028	49									
11	76028	77334	78620	79888	81137	82369	83584	48									
12	83584	84782	85963	87129	88279	89414	90535	47									
13	90535	91614	92733	93812	94877	95930	96970	46									
14	$^{6}_{7}$.96970	97997	99013	00017	01009	01990	02960	45									
15	7.02960	03920	04869	05807	06736	07655	08564	44	93	187	280	373	467	560	653	746	840
16	08564	09464	10354	11236	12108	12972	13827	43	87	175	263	350	438	526	614	702	789
17	13827	14674	15513	16344	17167	17982	18790	42	82	165	248	331	413	496	579	662	744
18	18790	19590	20383	21168	21947	22719	23483	41	78	156	234	313	391	469	547	625	704
19	23483	24241	24993	25738	26477	27210	27936	40	74	148	222	296	370	444	518	592	666
20	7.27936	28656	29371	30079	30782	31479	32171	39	70	140	211	281	352	422	492	563	633
21	32171	32857	33538	34213	34884	35549	36209	38	67	134	201	268	335	403	470	537	604
22	36209	36864	37514	38159	38800	39435	40067	37	64	128	192	256	320	385	449	513	577
23	40067	40693	41315	41933	42546	43155	43760	36	61	123	184	245	306	368	430	491	552
24	43760	44361	44957	45549	46138	46722	47302	35	59	118	171	235	295	353	412	471	531
25	7.47302	47879	48452	49021	49586	50148	50706	34	56	113	169	226	282	339	396	452	509
26	50706	51260	51811	52358	52902	53443	53980	33	54	109	163	218	272	327	381	436	490
27	53980	54514	55045	55572	56096	56017	57135	32	52	105	157	209	262	314	367	420	472
28	57135	57650	58162	58670	59176	59679	60179	31	51	101	152	202	253	303	354	405	455
29	60179	60676	61170	61662	62151	62636	63120	30	49	98	147	195	244	293	342	392	441
30	7.63120	63600	64078	64553	65026	65496	65964	29	47	95	142	189	236	284	331	378	426
31	65964	66429	66891	67351	67809	68264	68717	28	46	92	137	183	229	275	321	366	412
32	68717	69167	69616	70061	70505	70946	71385	27	44	89	133	178	222	267	311	355	400
33	71385	71822	72257	72689	73119	73548	73974	26	43	86	129	172	215	258	301	344	388
34	73974	74398	74819	75239	75657	76073	76487	25	42	83	125	167	209	251	293	334	377
35	7.76487	76898	77308	77716	78122	78526	78929	24	41	81	122	162	203	243	284	325	366
36	78929	79329	79728	80124	80519	80912	81303	23	40	79	118	158	197	237	277	316	356
37	81303	81693	82081	82467	82851	83234	83615	22	39	77	115	154	192	231	270	308	347
38	83615	83994	84372	84747	85122	85494	85866	21	38	75	112	150	187	225	263	300	338
39	85866	86235	86603	86969	87334	87697	88059	20	37	73	109	146	182	219	256	292	329
40	7.88059	88419	88778	89135	89491	89846	90198	19	36	71	106	142	178	213	249	284	321
41	90198	90550	90990	91248	91596	91941	92286	18	35	70	104	139	174	208	243	278	313
42	92286	92629	92970	93311	93650	93987	94324	17	34	68	102	136	170	204	238	272	306
43	94324	94659	94992	95325	95656	95986	96315	16	33	66	100	133	166	199	232	265	299
44	96315	96642	96968	97293	97617	97939	98260	15	32	65	97	130	162	194	227	259	292
45	$^{7}_{8}$.98260	98580	98899	99217	99534	99849	00163	14	32	63	95	127	158	190	222	253	286
46	8.00163	00476	00788	01099	01409	01717	02025	13	31	62	93	124	155	186	218	248	279
47	02025	02331	02636	02941	03244	03546	03847	12	30	61	91	121	152	182	212	243	273
48	03847	04147	04446	04744	95041	05366	05631	11	30	60	89	119	148	178	208	238	268
49	05631	05925	06218	06510	06800	07090	07379	10	29	58	87	116	145	175	204	233	262
50	8.07379	07667	07954	08240	08525	08809	09092	9	28	57	85	114	142	171	200	228	257
51	09092	09374	09656	09936	10216	10494	10772	8	28	56	84	112	140	168	196	224	252
52	10772	11048	11324	11599	11873	12147	12419	7	27	55	82	110	138	165	193	220	248
53	12419	12691	12961	13231	13500	13768	14035	6	27	54	81	108	135	162	189	216	243
54	14035	14302	14567	14832	15096	15359	15621	5	26	53	79	106	133	159	185	212	239
55	8.15621	15883	16144	16404	16663	16921	17179	4	26	52	78	104	130	156	182	208	234
56	17179	17436	17692	17947	18202	18455	18708	3	25	51	77	102	127	153	179	204	229
57	18708	18961	19212	19463	19713	19963	20211	2	25	50	75	100	125	150	175	200	221
58	20211	20459	29706	20953	21198	21444	21688	1	24	49	73	98	123	147	172	196	220
59	21688	21932	22175	22417	22658	22899	23140	0	24	48	72	96	120	145	169	193	217
	60s.	50s.	40s.	30s.	20s.	10s.	0s.	M.	1s.	2s.	3s.	4s.	5s.	6s.	7s.	8s.	9s.
	23 HOURS.								PROPORTIONAL PARTS FOR SECONDS.								

TABLE XIII.

LOGARITHMS of the APPARENT TIME, or HORARY ANGLE.

	1 HOUR.								PROPORTIONAL PARTS FOR SECONDS.								
M.	s. 0	s. 10	s. 20	s. 30	s. 40	s. 50	s. 60		s. 1	s. 2	s. 3	s. 4	s. 5	s. 6	s. 7	s. 8	s. 9
0	8.23140	23379	23618	23856	24094	24331	24567	59	24	47	71	95	118	142	166	190	213
1	24567	24802	25037	25272	25505	25738	25971	58	23	47	70	93	116	140	163	187	210
2	25971	26203	26434	26664	26894	27123	27352	57	23	46	69	92	115	138	161	184	207
3	27352	27580	27807	28034	28260	28486	28711	56	23	45	68	91	113	136	159	181	204
4	28711	28935	29159	29383	29605	29827	30049	55	22	44	67	89	111	133	156	178	200
5	8.30049	30270	30490	30710	30929	31148	31366	54	22	44	66	87	109	131	153	175	197
6	31366	31583	31800	32016	32233	32448	32663	53	22	43	65	86	108	130	151	173	195
7	32663	32877	33091	33304	33517	33729	33940	52	21	43	64	85	106	128	149	170	192
8	33940	34151	34362	34572	34782	34991	35199	51	21	42	63	84	105	126	147	168	189
9	35199	35407	35614	35821	36028	36234	36439	50	21	41	62	83	103	124	145	165	186
10	8.36439	36604	36849	37053	37256	37459	37662	49	20	41	61	82	102	122	143	163	184
11	37662	37864	38065	38266	38467	38667	38866	48	20	40	60	81	102	120	141	161	181
12	38866	39066	39264	39463	39660	39858	40055	47	20	40	60	80	99	119	139	159	179
13	40055	40251	40447	40642	40837	41032	41226	46	20	39	59	78	98	118	137	157	177
14	41226	41420	41613	41806	41998	42191	42382	45	19	39	58	77	96	116	135	154	174
15	8.42382	42573	42764	42954	43144	43333	43522	44	19	38	57	76	95	114	133	152	171
16	43522	43710	43898	44086	44273	44460	44647	43	19	37	56	75	93	112	131	150	169
17	44647	44833	45018	45204	45388	45573	45757	42	19	37	56	74	92	111	130	148	167
18	45757	45940	46124	46306	46489	46671	46852	41	18	37	55	73	92	110	128	146	165
19	46852	47034	47215	47395	47575	47755	47934	40	18	36	54	72	90	108	126	144	162
20	8.47934	48113	48292	48470	48647	48825	49002	39	18	35	53	71	89	107	125	142	160
21	49002	49179	49355	49531	49706	49882	50056	38	18	35	53	70	88	106	123	141	158
22	50056	50231	50405	50579	50752	50925	51098	37	17	35	52	70	87	104	122	139	157
23	51098	51270	51442	51614	51785	51956	52127	36	17	34	52	69	86	103	120	138	155
24	52127	52297	52467	52636	52805	52974	53143	35	17	34	51	68	85	102	119	136	153
25	8.53143	53311	53479	53646	53814	53980	54147	34	17	33	50	67	83	100	117	134	151
26	54147	54313	54479	54645	54810	54975	55139	33	17	33	50	66	82	99	116	132	149
27	55139	55303	55467	55631	55794	55957	56120	32	16	33	49	65	81	98	114	130	147
28	56120	56282	56444	56606	56767	56928	57089	31	16	32	48	64	80	97	113	129	145
29	57089	57249	57410	57569	57729	57888	58047	30	16	32	48	63	80	96	111	127	143
30	8.58047	58206	58364	58522	58680	58837	58994	29	16	32	47	63	79	95	110	126	142
31	58994	59151	59308	59464	59620	59776	59931	28	16	31	47	62	78	94	109	125	141
32	59931	60086	60241	60395	60550	60704	60857	27	15	31	46	62	77	93	108	123	139
33	60857	61011	61164	61317	61469	61621	61773	26	15	30	46	61	77	92	107	122	138
34	61773	61925	62076	62228	62379	62529	62679	25	15	30	45	60	76	91	106	121	136
35	8.62679	62830	62979	63129	63278	63427	63576	24	15	30	45	60	75	90	105	119	134
36	63576	63724	63872	64020	64168	64315	64463	23	15	30	45	59	74	89	104	118	133
37	64463	64609	64756	64902	65048	65194	65340	22	15	29	44	58	73	88	102	117	132
38	65340	65485	65630	65775	65920	66664	66208	21	15	29	43	58	72	87	101	116	130
39	66208	66352	66496	66639	66782	66926	67067	20	14	29	43	57	72	86	100	115	129
40	8.67067	67209	67352	67494	67635	67777	67918	19	14	28	43	57	71	85	99	113	128
41	67918	68059	68199	68340	68480	68620	68759	18	14	28	42	56	70	84	98	112	126
42	68759	68899	69038	69177	69316	69454	69593	17	14	28	42	55	69	83	97	111	125
43	69593	69731	69869	70006	70144	70281	70418	16	14	27	41	55	69	82	96	110	124
44	70418	70554	70691	70827	70963	71099	71234	15	14	27	41	54	68	82	95	109	123
45	8.71234	71370	71505	71640	71774	71909	72043	14	14	27	40	54	67	81	95	108	122
46	72043	72177	72311	72444	72578	72711	72844	13	13	27	40	53	67	80	94	107	121
47	72844	72977	73109	73241	73374	73505	73637	12	13	26	40	53	66	79	93	106	119
48	73637	73768	73900	74031	74162	74292	74423	11	13	26	39	52	65	78	92	105	118
49	74423	74553	74683	74813	74942	75072	75201	10	13	26	39	52	65	78	91	104	117
50	8.75201	75330	75458	75587	75715	75843	75971	9	13	26	38	51	64	77	90	103	116
51	75971	76099	76227	76354	76481	76608	76735	8	13	25	38	51	63	76	89	102	115
52	76735	76862	76988	77114	77240	77366	77492	7	13	25	38	50	63	76	88	101	114
53	77492	77617	77742	77867	77992	78117	78241	6	13	25	37	50	62	75	87	100	113
54	78241	78365	78489	78613	78737	78861	78984	5	12	25	37	50	62	75	87	99	112
55	8.78984	79107	79230	79353	79475	79598	79720	4	12	25	37	49	61	74	86	98	111
56	79720	79842	79964	80085	80207	80328	80449	3	12	25	37	49	61	73	85	98	110
57	80449	80570	80691	80812	80932	81052	81172	2	12	24	36	48	60	73	85	97	109
58	81172	81292	81412	81531	81651	81770	81889	1	12	24	36	48	60	72	84	96	108
59	81889	82008	82126	82245	82363	82481	82599	0	12	24	36	48	60	72	83	95	107
	60s.	50s.	40s.	30s.	20s	10s.	0s.	M.	1s.	2s.	3s.	4s.	5s.	6s.	7s.	8s.	9s.
	22 HOURS.								PROPORTIONAL PARTS FOR SECONDS.								

TABLE XIII.

LOGARITHMS of the APPARENT TIME, or HORARY ANGLE.

	2 HOURS.								PROPORTIONAL PARTS FOR SECONDS.								
M.	s. 0	s. 10	s. 20	s. 30	s. 40	s. 50	s. 60		s. 1	s. 2	s. 3	s. 4	s. 5	s. 6	s. 7	s. 8	s. 9
0	8.82599	82717	82835	82952	83069	83187	83303	59	12	23	35	47	59	70	82	93	105
1	83303	83420	83537	83653	83769	33885	84001	58	12	23	35	46	58	70	81	93	105
2	84001	84117	84233	84348	84464	84579	84694	57	11	23	35	46	57	69	80	92	104
3	84694	84808	84923	85037	85152	85266	85380	56	11	23	34	45	57	68	80	91	103
4	85380	85494	85607	85721	85834	85947	86060	55	11	23	34	45	57	68	79	90	102
5	8.86060	86173	86286	86398	86511	86623	86735	54	11	22	34	45	56	67	78	90	101
6	86735	86847	86959	87070	87182	87293	87404	53	11	22	33	45	56	67	78	89	100
7	87404	87515	87626	87736	87847	87957	88068	52	11	22	33	44	55	66	78	89	100
8	88068	88178	88288	88397	88307	88616	88726	51	11	22	33	44	55	66	77	88	99
9	88726	88835	88944	89053	89162	89270	89379	50	11	22	33	44	55	65	76	87	98
10	8.89379	89487	89595	89703	89811	89918	90026	49	11	22	32	43	54	65	76	86	97
11	90026	90133	90241	90348	90455	90562	90668	48	11	21	32	43	54	64	75	86	96
12	90668	90775	90881	90988	91094	91200	91306	47	11	21	32	42	53	63	74	85	95
13	91306	91411	91517	91622	91728	91833	91938	46	11	21	32	42	53	63	73	84	95
14	91938	92043	92147	92252	92356	92461	92565	45	10	21	32	42	53	63	73	84	94
15	8.92565	92669	92773	92877	92980	93084	93187	44	10	21	31	42	52	62	73	83	93
16	93187	93290	93393	93496	93599	93702	93804	43	10	20	31	41	52	62	72	82	93
17	93804	93907	94009	94111	94213	94315	94417	42	10	20	31	41	51	61	71	82	92
18	94417	94519	94620	94722	94823	94924	95025	41	10	20	30	40	51	61	71	81	91
19	95025	95126	95227	95327	95428	95528	95628	40	10	20	30	40	50	69	70	80	90
20	8.95628	95728	95828	95928	96028	96128	96227	39	10	20	30	40	50	60	70	80	90
21	96227	96326	96426	96525	96624	96723	96821	38	10	20	30	40	50	60	69	79	89
22	96821	96920	97018	97117	97215	97313	97411	37	10	20	30	39	49	59	69	79	88
23	97411	97509	97607	97704	97802	97899	97996	36	10	19	29	39	49	58	68	78	87
24	97996	98094	98191	98288	98384	98481	98578	35	10	19	29	39	49	58	68	77	87
25	8.98578	98674	98770	98866	98963	99058	99154	34	10	19	29	38	48	58	67	77	86
26	99154	99250	99346	99441	99536	99632	99727	33	10	19	29	38	48	57	67	76	86
27	$\frac{8}{9}$.99727	99822	99917	00012	00106	00201	00295	32	9	19	28	38	47	57	66	76	85
28	9.00295	00390	00484	00578	00672	00766	00860	31	9	19	28	38	47	56	66	75	85
29	00860	00953	01047	01140	01234	01327	01420	30	9	19	28	37	47	56	65	75	84
30	9.01420	01513	01606	01698	01791	01884	01976	29	9	18	28	37	46	55	65	74	83
31	01976	02068	02161	02253	02345	02437	02528	28	9	18	28	37	46	55	64	74	83
32	02528	02620	02712	02803	02894	02986	03077	27	9	18	27	37	46	55	64	73	82
33	03077	03168	03259	03350	03440	03531	03621	26	9	18	27	36	45	54	64	73	82
34	03621	03712	03802	03892	03982	04072	04162	25	9	18	27	36	45	54	63	72	81
35	9.04162	04252	04341	04431	04520	04610	04699	24	9	18	27	36	45	54	63	72	81
36	04699	04788	04877	04966	05055	05144	05232	23	9	18	27	36	45	53	62	71	80
37	05232	05321	05409	05498	05586	05674	05762	22	9	18	26	35	44	53	62	71	79
38	05762	05850	05938	06025	06113	06200	06288	21	9	17	26	35	44	53	61	70	79
39	06288	06375	00462	06550	06637	06724	06810	20	9	17	26	35	43	52	61	70	78
40	9.06810	06897	06984	07070	07157	07243	07329	19	9	17	26	35	43	52	61	69	78
41	07329	07415	07501	07587	07673	07759	07845	18	9	17	26	34	43	52	60	69	77
42	07845	07930	08016	08101	08186	08271	08357	17	9	17	26	34	43	51	60	68	77
43	08357	08442	08526	08611	08696	08781	08865	16	8	17	25	34	42	51	59	67	76
44	08865	08949	09034	09118	09202	09286	09370	15	8	17	25	34	42	51	59	67	76
45	9.09370	09454	09538	09622	09705	09789	09872	14	8	17	25	34	42	50	59	67	76
46	09872	09955	10039	10122	10205	10288	10371	13	8	17	25	33	42	50	58	66	75
47	10371	10453	10536	10619	10701	10784	10866	12	8	16	25	33	41	50	58	66	74
48	10866	10948	11030	11112	11194	11276	11358	11	8	16	25	33	41	49	57	66	74
49	11358	11440	11521	11693	11684	11765	11847	10	8	16	24	33	41	49	57	65	73
50	9.11847	11928	12009	12090	12171	12252	12332	9	8	16	24	32	40	49	57	65	73
51	12332	12413	12494	12574	12655	12735	12815	8	8	16	24	32	40	48	56	64	73
52	12815	12895	12975	13055	13135	13215	13295	7	8	16	24	32	40	48	56	64	72
53	13295	13374	13454	13533	13613	13692	13771	6	8	16	24	32	40	48	56	64	72
54	13771	13850	13929	14008	14087	14166	14245	5	8	16	24	32	40	47	55	63	71
55	9.14245	14323	14402	14480	14559	14637	14715	4	8	16	24	31	39	47	55	63	71
56	14715	14793	14871	14949	15027	15105	15183	3	8	16	23	31	39	47	55	62	70
57	15183	15260	15338	15415	15493	15570	15647	2	8	15	23	31	39	47	54	62	70
58	15647	15724	15802	15879	15955	16032	16109	1	8	15	23	31	38	46	54	62	69
59	16109	16186	16262	16339	16415	16492	16568	0	8	15	23	31	38	46	54	61	69
	60s.	50s.	40s.	30s.	20s.	10s.	0s.	M.	1s.	2s.	3s.	4s.	5s.	6s.	7s.	8s.	9s.
	21 HOURS.								PROPORTIONAL PARTS FOR SECONDS.								

TABLE XIII.

Logarithms of the Apparent Time, or Horary Angle.

	3 HOURS.								PROPORTIONAL PARTS FOR SECONDS.								
M.	s. 0	s. 10	s. 20	s. 30	s. 40	s. 50	s. 60		s. 1	s. 2	s. 3	s. 4	s. 5	s. 6	s. 7	s. 8	s. 9
0	9.16568	16644	16720	16796	16872	16948	17024	59	8	15	23	30	38	46	53	61	68
1	17024	17100	17175	17251	17326	17402	17477	58	8	15	23	30	38	45	53	60	68
2	17477	17553	17628	17703	17778	17853	17928	57	7	15	22	30	37	45	52	60	67
3	17928	18003	18077	18152	18227	18301	18376	56	7	14	22	30	37	45	52	60	67
4	18376	18450	18524	18598	18673	18747	18821	55	7	14	22	30	37	44	52	59	67
5	9.18821	18895	18968	19042	19116	19190	19263	54	7	14	22	30	37	44	52	59	67
6	19263	19337	19410	19483	19557	19630	19703	53	7	14	22	29	37	44	51	59	66
7	19703	19776	19849	19922	19995	20067	20140	52	7	14	22	29	37	44	51	58	66
8	20140	20213	20285	20358	20430	20502	20574	51	7	14	22	29	36	44	51	58	65
9	20574	20647	20719	20791	20863	20935	21006	50	7	14	22	29	36	43	50	58	65
10	9.21006	21078	21150	21221	21293	21364	21436	49	7	14	21	29	36	43	50	57	64
11	21436	21507	21578	21650	21721	21792	21863	48	7	14	21	28	36	43	50	57	64
12	21863	21934	22004	22075	22146	22216	22287	47	7	14	21	28	35	42	49	56	63
13	22287	22358	22428	22498	22569	22639	22709	46	7	14	21	28	35	42	49	56	63
14	22709	22779	22849	22919	22989	23059	23128	45	7	14	21	28	35	42	49	56	63
15	9.23128	23198	23268	23337	23407	23476	23545	44	7	14	21	28	35	42	49	56	63
16	23545	23615	23684	23753	23822	23891	23960	43	7	14	21	28	35	41	48	55	62
17	23960	24029	24098	24166	24235	24304	24372	42	7	14	21	28	35	41	48	55	62
18	24372	24441	24509	24577	24646	24714	24782	41	7	14	21	27	34	41	48	55	62
19	24782	24850	24918	24986	25054	25122	25190	40	7	14	20	27	34	41	48	54	61
20	9.25190	25257	25325	25393	25460	25527	25595	39	7	14	20	27	34	41	47	54	61
21	25595	25662	25729	25796	25864	25931	25998	38	7	13	20	27	34	40	47	54	60
22	25998	26065	26132	26198	26265	26332	26398	37	7	13	20	27	34	40	47	54	60
23	26398	26465	26532	26598	26664	26731	26797	36	7	13	20	27	33	40	47	53	60
24	26797	26863	26929	26995	27061	27127	27193	35	7	13	20	26	33	40	46	53	59
25	9.27193	27259	27325	27390	27456	27521	27587	34	7	13	20	26	33	40	46	53	59
26	27587	27652	27718	27783	27848	27914	27979	33	7	13	20	26	33	39	46	52	59
27	27979	28044	28109	28174	28239	28304	28368	32	6	13	20	26	32	39	46	52	59
28	28368	28433	28498	28562	28627	28691	28756	31	6	13	20	26	32	39	46	52	59
29	28756	28820	28885	28949	29013	29077	29141	30	6	13	19	26	32	39	45	52	58
30	9.29141	29205	29269	29333	29397	29461	29524	29	6	13	19	26	32	38	45	51	58
31	29524	29588	29652	29715	29779	29842	29905	28	6	13	19	25	32	38	45	51	57
32	29905	29969	30032	30095	30158	30221	30285	27	6	13	19	25	32	38	44	51	57
33	30285	30347	30410	30473	30536	30599	30661	26	6	13	19	25	32	38	44	50	57
34	30661	30724	30787	30849	30912	30974	31036	25	6	12	19	25	31	38	44	50	56
35	9.31036	31099	31161	31223	31285	31347	31409	24	6	12	19	25	31	37	43	50	56
36	31409	31471	31533	31595	31657	31719	31780	23	6	12	19	25	31	37	43	50	56
37	31780	31842	31903	31965	32026	32088	32149	22	6	12	18	25	31	37	43	49	55
38	32149	32210	32272	32333	32394	32455	32516	21	6	12	18	24	31	37	43	49	55
39	32516	32577	32638	32699	32760	32820	32881	20	6	12	18	24	31	37	43	49	55
40	9.32881	32942	33002	33063	33123	33184	33244	19	6	12	18	24	30	36	42	48	55
41	33244	33304	33365	33425	33485	33545	33605	18	6	12	18	24	30	36	42	48	54
42	33605	33665	33725	33785	33845	33905	33965	17	6	12	18	24	30	36	42	48	54
43	33965	34024	34084	34143	34203	34262	34322	16	6	12	18	24	30	36	42	48	54
44	34322	34381	34441	34500	34559	34618	34677	15	6	12	18	24	30	36	41	47	53
45	9.34677	34736	34795	34854	34913	34772	35031	14	6	12	18	24	30	35	41	47	53
46	35031	35090	35148	35207	35266	35324	35383	13	6	12	18	24	30	35	41	47	53
47	35383	35441	35499	35558	35616	35674	35733	12	6	12	18	23	29	35	41	47	53
48	35733	35791	35849	35907	35965	36023	36081	11	6	12	17	23	29	35	41	46	52
49	36081	36139	36196	36254	36312	36369	36427	10	6	12	17	23	29	35	41	46	52
50	9.36427	36485	36542	36599	36657	36714	36771	9	6	11	17	23	29	35	40	46	52
51	36771	36829	36886	36943	37000	37057	37114	8	6	11	17	23	29	34	40	46	51
52	37114	37171	37228	37285	37342	37399	37455	7	6	11	17	23	29	34	40	46	51
53	37455	37512	37568	37625	37682	37738	37794	6	6	11	17	23	28	34	40	45	51
54	37794	37851	37907	37963	38020	38076	38132	5	6	11	17	22	28	34	39	45	51
55	9.38132	38188	38244	38300	38356	38412	38468	4	6	11	17	22	28	34	39	45	50
56	38468	38524	38579	38635	38691	38746	38802	3	6	11	17	22	28	33	39	44	50
57	38802	38857	38913	38968	39024	39079	39134	2	6	11	17	22	28	33	39	44	50
58	39134	39189	39245	39300	39355	39410	39465	1	6	11	16	22	28	33	39	44	50
59	39465	39520	39575	39630	39684	39739	39794	0	6	11	16	22	28	33	39	44	50
	60s.	50s.	40s.	30s.	20s.	10s.	0s.	M.	1s.	2s.	3s.	4s.	5s.	6s.	7s.	8s.	9s.
	20 HOURS.								PROPORTIONAL PARTS FOR SECONDS.								

TABLE XIII.

LOGARITHMS of the APPARENT TIME, or HORARY ANGLE.

M.	4 HOURS.								PROPORTIONAL PARTS FOR SECONDS.								
	s. 0	s. 10	s. 20	s. 30	s. 40	s. 50	s. 60		s. 1	s. 2	s. 3	s. 4	s. 5	s. 6	s. 7	s. 8	s. 9
0	9.39794	39849	39903	39958	40012	40067	40121	59	5	11	16	22	28	33	39	44	50
1	40121	40176	40230	40284	40339	40393	40447	58	5	11	16	22	27	33	38	44	49
2	40447	40501	40555	40609	40663	40717	40771	57	5	11	16	22	27	32	38	43	49
3	40771	40825	40879	40933	40986	41040	41094	56	5	11	16	22	27	32	38	43	49
4	41094	41147	41201	41254	41308	41361	41415	55	5	11	16	21	27	32	37	43	48
5	9.41415	41468	41521	41575	41628	41681	41734	54	5	11	16	21	27	32	37	43	48
6	41734	41787	41840	41893	41946	41999	42052	53	5	11	16	21	27	32	37	43	48
7	42052	42105	42157	42210	42263	42315	42368	52	5	10	16	21	26	31	37	42	47
8	42368	42420	42473	42525	42578	42630	42682	51	5	10	16	21	26	31	37	42	47
9	42682	42735	42787	42839	42891	42943	42996	50	5	10	16	21	26	31	36	42	47
10	9.42996	43048	43100	43151	43203	43255	43307	49	5	10	16	21	26	31	36	42	47
11	43307	43359	43411	43462	43514	43565	43617	48	5	10	15	21	26	31	36	41	46
12	43616	43699	43720	43771	43823	43874	43925	47	5	10	15	20	25	31	36	41	46
13	43925	43977	44028	44079	44130	44181	44232	46	5	10	15	20	25	31	36	41	46
14	44232	44283	44334	44385	44436	44487	44538	45	5	10	15	20	25	31	36	41	46
15	9.44538	44589	44639	44690	44741	44791	44842	44	5	10	15	20	25	30	35	40	45
16	44842	44892	44943	44993	45044	45094	45144	43	5	10	15	20	25	30	35	40	45
17	45144	45195	45245	45295	45345	45395	45446	42	5	10	15	20	25	30	35	40	45
18	45446	45496	45546	45595	45645	45695	45745	41	5	10	15	20	25	30	35	40	45
19	45745	45795	45845	45894	45944	45994	46043	40	5	10	15	20	25	30	35	40	45
20	9.46043	46093	46142	46192	46241	46291	46340	39	5	10	15	20	25	30	35	40	45
21	46340	46389	46439	46488	46537	46586	46635	38	5	10	15	20	25	29	34	39	44
22	46635	46684	46733	46782	46831	46880	46929	37	5	10	15	20	24	29	34	39	44
23	46929	46978	47027	47076	47124	47173	47222	36	5	10	15	20	24	29	34	39	44
24	47222	47270	47319	47367	47416	47464	47513	35	5	10	15	19	24	29	34	39	44
25	9.47513	47561	47610	47658	47706	47754	47803	34	5	10	14	19	24	29	34	38	43
26	47803	47851	47899	47947	47995	48043	48091	33	5	10	14	19	24	29	34	38	43
27	48091	48139	48187	48235	48282	48330	48378	32	5	10	14	19	24	29	34	38	43
28	48378	48425	48473	48521	48568	48616	48664	31	5	9	14	19	24	29	33	38	43
29	48664	48711	48758	48806	48853	48900	48948	30	5	9	14	19	24	28	33	38	42
30	9.48948	48995	49042	49089	49137	49184	49231	29	5	9	14	19	23	28	33	38	42
31	49231	49278	49325	49372	49419	49465	49512	28	5	9	14	19	23	28	33	38	42
32	49512	49559	49606	49653	49699	49746	49793	27	5	9	14	19	23	28	33	37	42
33	49793	49839	49886	49932	49979	50025	50071	26	5	9	14	19	23	28	33	37	42
34	50071	50118	50164	50211	50257	50303	50349	25	5	9	14	19	23	28	33	37	42
35	9.50349	50395	50441	50488	50534	50580	50626	24	5	9	14	18	23	28	32	37	41
36	50626	50672	50717	50763	50809	50855	50901	23	5	9	14	18	23	28	32	37	41
37	50901	50946	50992	51038	51083	51129	51174	22	5	9	14	18	23	27	32	36	41
38	51174	51220	51265	51311	51356	51402	51447	21	5	9	14	18	23	27	32	36	41
39	51447	51492	51538	51583	51628	51673	51718	20	4	9	13	18	22	27	31	36	40
40	9.51718	51763	51808	51853	51898	51943	51988	19	4	9	13	18	22	27	31	36	40
41	51988	52033	52078	52123	52168	52212	52257	18	4	9	13	18	22	27	31	36	40
42	52257	52302	52346	52391	52435	52480	52525	17	4	9	13	18	22	27	31	36	40
43	52525	52569	52613	52658	52702	52747	52791	16	4	9	13	18	22	27	31	36	40
44	52791	52835	52879	52923	52968	53012	53056	15	4	9	13	18	22	27	31	35	40
45	9.53056	53100	53144	53188	53232	53276	53320	14	4	9	13	18	22	26	31	35	40
46	53320	53364	53407	53451	53495	53539	53582	13	4	9	13	18	22	26	31	35	40
47	53582	53626	53670	53713	53757	53800	53844	12	4	9	13	17	22	26	30	35	39
48	53844	53887	53931	53974	54017	54061	54104	11	4	9	13	17	22	26	30	35	39
49	54104	54147	54190	54234	54277	54320	54363	10	4	9	13	17	22	26	30	35	39
50	9.54363	54406	54449	54492	54535	54578	54621	9	4	9	13	17	22	26	30	34	39
51	54621	54664	54707	54749	54792	54835	54878	8	4	9	13	17	22	26	30	34	39
52	54878	54920	54963	55005	55048	55091	55133	7	4	8	13	17	21	26	30	34	38
53	55133	55175	55218	55260	55303	55345	55387	6	4	8	13	17	21	26	30	34	38
54	55387	55430	55472	55514	55556	55598	55641	5	4	8	13	17	21	25	29	34	38
55	9.55641	55683	55725	55767	55809	55851	55893	4	4	8	13	17	21	25	29	34	38
56	55893	55934	55976	56018	56060	56102	56144	3	4	8	13	17	21	25	29	34	38
57	56144	56185	56227	56269	56310	56352	56393	2	4	8	12	17	21	25	29	33	37
58	56393	56435	56476	56518	56559	56601	56642	1	4	8	12	17	21	25	29	33	37
59	56642	56683	56725	56766	56807	56848	56839	0	4	8	12	16	20	25	29	33	37
	60s.	50s.	40s.	30s.	20s.	10s.	0s.	M.	1s.	2s.	3s.	4s.	5s.	6s.	7s.	8s.	9s.
	19 HOURS.								PROPORTIONAL PARTS FOR SECONDS								

TABLE XIII.

Logarithms of the Apparent Time, or Horary Angle.

	5 HOURS.								PROPORTIONAL PARTS FOR SECONDS.								
M.	s. 0	s. 10	s. 20	s. 30	s. 40	s. 50	s. 60		s. 1	s. 2	s. 3	s. 4	s. 5	s. 6	s. 7	s. 8	s. 9
0	9.56889	56931	56972	57013	57054	57095	57136	59	4	8	12	16	20	25	29	33	37
1	57136	57177	57218	57259	57299	57340	57381	58	4	8	12	16	20	25	29	33	37
2	57381	57422	57463	57503	57544	57585	57625	57	4	8	12	16	20	25	29	33	37
3	57625	57666	57706	57747	57787	57828	57868	56	4	8	12	16	20	24	28	32	36
4	57868	57909	57949	57990	58030	58870	58110	55	4	8	12	16	20	24	28	32	36
5	9.58110	58151	58191	58231	58271	58311	58351	54	4	8	12	16	20	24	28	32	36
6	58351	58391	58431	58471	58511	58551	58591	53	4	8	12	16	20	24	28	32	36
7	58591	58631	58671	58711	58750	58790	58830	52	4	8	12	16	20	24	28	32	36
8	58830	58870	58909	58949	58988	59028	59068	51	4	8	12	16	20	24	28	32	36
9	59068	59107	59147	59186	59225	59265	59304	50	4	8	12	16	20	24	28	32	36
10	9.59304	59344	59383	59422	59461	59501	59540	49	4	8	12	16	20	24	28	32	36
11	59540	59577	59618	59657	59696	59735	59774	48	4	8	12	16	20	23	27	31	35
12	59774	59813	59852	59891	59930	59969	60008	47	4	8	12	16	20	23	27	31	35
13	60008	60047	60085	60124	60163	60202	60240	46	4	8	12	16	20	23	27	31	35
14	60240	60279	60318	60356	60395	60433	60472	45	4	8	12	16	20	23	27	31	35
15	9.60472	60510	60549	60587	60625	60664	60702	44	4	8	12	15	19	23	27	31	35
16	60702	60740	60779	60817	60855	60893	60931	43	4	8	12	15	19	23	27	31	35
17	60931	60970	61008	61046	61084	61122	61160	42	4	8	11	15	19	23	27	30	34
18	61160	61198	61236	61274	61311	61349	61387	41	4	8	11	15	19	23	27	30	34
19	61387	61425	61463	61500	61538	61576	61613	40	4	8	11	15	19	23	27	30	34
20	9.61613	61651	61689	61726	61764	61801	61839	39	4	8	11	15	19	23	27	30	34
21	61839	61876	61914	61951	61988	62026	62063	38	4	7	11	15	19	22	26	30	34
22	62063	62100	62138	62175	62212	62249	62287	37	4	7	11	15	19	22	26	30	34
23	62287	62324	62361	62398	62435	62472	62509	36	4	7	11	15	18	22	26	30	33
24	62509	62546	62583	62620	62657	62693	62730	35	4	7	11	15	18	22	26	30	33
25	9.62730	62767	62804	62841	62877	62914	62951	34	4	7	11	15	18	22	26	30	33
26	62951	62987	63024	63061	63097	63134	63170	33	4	7	11	15	18	22	26	29	33
27	63170	63207	63243	63279	63316	63352	63389	32	4	7	11	15	18	22	26	29	33
28	63389	63425	63461	63497	63534	63570	63606	31	4	7	11	14	18	22	25	29	32
29	63606	63642	63678	63715	63751	63787	63823	30	4	7	11	14	18	22	25	29	32
30	9.63823	63859	63895	63931	63966	64002	64038	29	4	7	11	14	18	22	25	29	32
31	64038	64074	64110	64146	64181	64217	64253	28	4	7	11	14	18	22	25	29	32
32	64253	64289	64324	64360	64395	64431	64467	27	4	7	11	14	18	21	25	28	32
33	64467	64502	64538	64573	64609	64644	64679	26	4	7	11	14	18	21	25	28	32
34	64679	64715	64750	64785	64821	64856	64891	25	4	7	11	14	18	21	25	28	32
35	9.64891	64926	64962	64997	65032	65067	65102	24	4	7	10	14	18	21	25	28	31
36	65102	65137	65172	65207	65242	65277	65312	23	3	7	10	14	18	21	25	28	31
37	65312	65347	65382	65417	65452	65486	65521	22	3	7	10	14	18	21	25	28	31
38	65521	65556	65591	65625	65660	65695	65729	21	3	7	10	14	18	21	25	28	31
39	65729	65764	65799	65834	65868	65902	65937	20	3	7	10	14	17	21	24	28	31
40	9.65937	65971	66006	66040	66074	66109	66143	19	3	7	10	14	17	21	24	28	31
41	66143	66177	66212	66246	66280	66314	66348	18	3	7	10	14	17	21	24	28	31
42	66348	66383	66417	66451	66485	66519	66553	17	3	7	10	14	17	20	24	27	31
43	66553	66587	66621	66655	66689	66723	66757	16	3	7	10	14	17	20	24	27	30
44	66757	66791	66824	66858	66892	66926	66959	15	3	7	10	14	17	20	24	27	30
45	9.66959	66993	67027	67060	67094	67128	67161	14	3	7	10	14	17	20	24	27	30
46	67161	67195	67228	67262	67295	67329	67362	13	3	7	10	13	17	20	23	27	30
47	67362	67396	67429	67462	67496	67529	67562	12	3	7	10	13	17	20	23	27	30
48	67562	67596	67629	67662	67695	67729	67762	11	3	7	10	13	17	20	23	27	30
49	67762	67795	67828	67861	67894	67927	67960	10	3	7	10	13	16	20	23	26	30
50	9.67960	67993	68026	68059	68092	68125	68158	9	3	7	10	13	16	20	23	26	30
51	68158	68190	68223	68256	68289	68322	68354	8	3	7	10	13	16	20	23	26	30
52	68354	68387	68420	68452	68485	68517	68550	7	3	7	10	13	16	19	23	26	29
53	68550	68583	68615	68648	68680	68713	68745	6	3	7	10	13	16	19	23	26	29
54	68745	68777	68810	68842	68874	68907	68939	5	3	7	10	13	16	19	23	26	29
55	9.68939	68971	69004	69036	69068	69100	69132	4	3	6	10	13	16	19	22	26	29
56	69132	69164	69197	69229	69261	69293	69825	3	3	6	10	13	16	19	22	26	29
57	69325	69357	69389	69421	69453	69484	69516	2	3	6	10	13	16	19	22	26	29
58	69516	69548	69580	69612	69644	69675	69707	1	3	6	10	13	16	19	22	26	29
59	69707	69739	69770	69802	69834	69866	69897	0	3	6	10	13	16	19	22	26	29
	60s.	50s.	40s.	30s.	20s.	10s.	0s.	M.	1s.	2s.	3s.	4s.	5s.	6s.	7s.	8s.	9s.
	18 HOURS.								PROPORTIONAL PARTS FOR SECONDS.								

TABLE XIII.

LOGARITHMS of the APPARENT TIME, or HORARY ANGLE.

M.	6 HOURS.								PROPORTIONAL PARTS FOR SECONDS.								
	s. 0	s. 10	s. 20	s. 30	s. 40	s. 50	s. 60		s. 1	s. 2	s. 3	s. 4	s. 5	s. 6	s. 7	s. 8	s. 9
0	9.69897	69929	69960	69992	70023	70055	70086	59	3	6	9	13	16	19	22	25	28
1	70086	70118	70149	70180	70211	70243	70274	58	3	6	9	13	16	19	22	25	28
2	70274	70306	70337	70368	70399	70431	70462	57	3	6	9	13	16	19	22	25	28
3	70462	70493	70524	70555	70586	70617	70648	56	3	6	9	12	15	19	22	25	28
4	70648	70680	70710	70741	70772	70803	70834	55	3	6	9	12	15	19	22	25	28
5	9.70834	70865	70896	70927	70958	70988	71019	54	3	6	9	12	15	19	22	25	28
6	71019	71050	71081	71111	71142	71173	71203	53	3	6	9	12	15	19	22	25	28
7	71203	71234	71265	71295	71326	71356	71387	52	3	6	9	12	15	18	21	24	27
8	71387	71417	71448	71478	71509	71539	71569	51	3	6	9	12	15	18	21	24	27
9	71569	71600	71630	71660	71691	71721	71751	50	3	6	9	12	15	18	21	24	27
10	9.71751	71781	71812	71842	71872	71902	71932	49	3	6	9	12	15	18	21	24	27
11	71932	71962	71992	72022	72052	72082	72112	48	3	6	9	12	15	18	21	24	27
12	72112	72142	72172	72202	72232	72262	72292	47	3	6	9	12	15	18	21	24	27
13	72292	72322	72352	72381	72411	72441	72471	46	3	6	9	12	15	18	21	24	27
14	72471	72500	72530	72560	72589	72619	72648	45	3	6	9	12	15	18	21	24	27
15	9.72648	72678	72708	72737	72767	72796	72825	44	3	6	9	12	15	18	21	24	27
16	72825	72855	72884	72914	72943	72972	73002	43	3	6	9	12	15	18	21	24	27
17	73002	73031	73060	73090	73119	73148	73177	42	3	6	9	12	14	17	20	23	26
18	73177	73207	73236	73265	73294	73323	73352	41	3	6	9	12	14	17	20	23	26
19	73352	73381	73410	73439	73468	73497	73526	40	3	6	9	12	14	17	20	23	26
20	9.73526	73555	73584	73613	73642	73671	73699	39	3	6	9	12	14	17	20	23	26
21	73699	73728	73757	73786	73815	73843	73872	38	3	6	9	11	14	17	20	23	26
22	73872	73901	73929	73958	73987	74015	74044	37	3	6	9	11	14	17	20	23	26
23	74044	74072	74101	74129	74158	74186	74215	36	3	6	9	11	14	17	20	23	26
24	74215	74243	74272	74300	74328	74357	74385	35	3	6	9	11	14	17	20	23	26
25	9.74385	74413	74442	74470	74498	74526	74554	34	3	6	8	11	14	17	20	22	25
26	74554	74583	74611	74639	74667	74695	74723	33	3	6	8	11	14	17	20	22	25
27	74723	74751	74779	74807	74835	74863	74891	32	3	6	8	11	14	17	20	22	25
28	74891	74919	74947	74975	75003	75031	75059	31	3	6	8	11	14	17	20	22	25
29	75059	75086	75114	75142	75170	75197	75225	30	3	6	8	11	14	17	20	22	25
30	9.75225	75253	75280	75308	75336	75363	75391	29	3	5	8	11	14	16	19	22	25
31	75391	75418	75446	75474	75501	75528	75556	28	3	5	8	11	14	16	19	22	25
32	75556	75583	75611	75638	75666	75693	75720	27	3	5	8	11	14	16	19	22	25
33	75720	75748	75775	75802	75830	75857	75884	26	3	5	8	11	14	16	19	22	25
34	75884	75911	75938	75966	75993	76020	76047	25	3	5	8	11	14	16	19	22	24
35	9.76047	76074	76101	76128	76155	76182	76209	24	3	5	8	11	14	16	19	22	24
36	76209	76236	76263	76290	76317	76344	76371	23	3	5	8	11	14	16	19	22	24
37	76371	76397	76424	76451	76478	76505	76531	22	3	5	8	11	14	16	19	21	24
38	76531	76558	76585	76611	76638	76665	76691	21	3	5	8	11	14	16	19	21	24
39	76691	76718	76745	76771	76798	76824	76851	20	3	5	8	11	13	16	19	21	24
40	9.76851	76877	76904	76930	76957	76983	77009	19	3	5	8	11	13	16	18	21	24
41	77009	77036	77002	77089	77115	77141	77167	18	3	5	8	11	13	16	18	21	24
42	77167	77194	77220	77246	77272	77298	77325	17	3	5	8	10	13	16	18	21	24
43	77325	77351	77377	77403	77429	77455	77481	16	3	5	8	10	13	16	18	21	24
44	77481	77507	77533	77559	77585	77611	77637	15	3	5	8	10	13	16	18	21	23
45	9.77637	77663	77689	77715	77741	77766	77792	14	3	5	8	10	13	15	18	21	23
46	77792	77818	77844	77870	77895	77921	77947	13	3	5	8	10	13	15	18	21	23
47	77947	77972	77998	78024	78049	78075	78101	12	3	5	8	10	13	15	18	21	23
48	78101	78126	78152	78177	78203	78228	78254	11	3	5	8	10	13	15	18	20	23
49	78254	78279	78305	78330	78355	78381	78406	10	3	5	8	10	13	15	18	20	23
50	9.78406	78431	78457	78482	78507	78533	78558	9	3	5	8	10	13	15	17	20	23
51	78558	78583	78608	78633	78659	78684	78709	8	3	5	7	10	13	15	17	20	23
52	78709	78734	78759	78784	78809	78834	78859	7	3	5	7	10	13	15	17	20	23
53	78859	78884	78909	78934	78959	78984	79009	6	3	5	7	10	13	15	17	20	23
54	79009	79034	79059	79084	79108	79133	79158	5	2	5	7	10	13	15	17	20	23
55	9.79158	79183	79208	79232	79257	79282	79306	4	2	5	7	10	13	15	17	20	23
56	79306	79331	79356	79380	79105	79430	79454	3	2	5	7	10	13	15	17	20	22
57	79454	79479	79503	79528	79552	79577	79601	2	2	5	7	10	12	15	17	20	22
58	79601	79626	79650	79674	79699	79723	79747	1	2	5	7	10	12	15	17	20	22
59	79747	79772	79796	79821	79845	79869	79893	0	2	5	7	10	12	15	17	20	22
	60s.	50s.	40s.	30s.	20s.	10s.	0s.	M.	1s.	2s.	3s.	4s.	5s.	6s.	7s.	8s.	9s.
	17 HOURS.								PROPORTIONAL PARTS FOR SECONDS.								

TABLE XIII.

LOGARITHMS of the APPARENT TIME, or HORARY ANGLE.

	7 HOURS.								PROPORTIONAL PARTS FOR SECONDS.								
M.	s. 0	s. 10	s. 20	s. 30	s. 40	s. 50	s. 60		s. 1	s. 2	s. 3	s. 4	s. 5	s. 6	s. 7	s. 8	s. 9
0	9.79893	79918	79942	79966	79990	80014	80038	59	2	5	7	10	12	14	17	19	22
1	80038	80063	80087	80111	80135	80159	80183	58	2	5	7	10	12	14	17	19	22
2	89183	80207	80231	80255	80279	80303	80327	57	2	5	7	10	12	14	17	19	22
3	80327	89350	80374	80398	80422	80446	80470	56	2	5	7	10	12	14	17	19	22
4	80470	80494	80517	80541	80565	80588	80612	55	2	5	7	9	12	14	16	19	21
5	9.80612	80636	80660	80683	80707	80730	80754	54	2	5	7	9	12	14	16	19	21
6	80754	80778	80801	80825	80848	80872	80895	53	2	5	7	9	12	14	16	19	21
7	80895	80919	80942	80966	80989	81012	81036	52	2	5	7	9	12	14	16	19	21
8	81036	81059	81082	81106	81129	81152	81176	51	2	5	7	9	11	14	16	18	21
9	81176	81199	81222	81245	81269	81292	81315	50	2	5	7	9	11	14	16	18	21
10	9.81315	81338	81361	81384	81407	81430	81454	49	2	5	7	9	11	14	16	18	21
11	81454	81477	81500	81523	81546	81569	81592	48	2	5	7	9	11	14	16	18	21
12	81592	81614	81637	81660	81683	81706	81729	47	2	5	7	9	11	14	16	18	21
13	81729	81752	81775	81797	81820	81843	81866	46	2	5	7	9	11	14	16	18	21
14	81866	81888	81911	81934	81956	81979	82002	45	2	5	7	9	11	14	16	18	20
15	9.82002	82024	82047	82070	82092	82115	82137	44	2	5	7	9	11	14	16	18	20
16	82137	82160	82182	82205	82227	82250	82272	43	2	5	7	9	11	14	16	18	20
17	82272	82294	82317	82339	82362	82384	82406	42	2	5	7	9	11	14	16	18	20
18	82406	82429	82451	82473	82495	82518	82540	41	2	5	7	9	11	14	16	18	20
19	82540	82562	82584	82606	82629	82651	82673	40	2	4	7	9	11	13	15	18	20
20	9.82673	82695	82717	82739	82761	82783	82805	39	2	4	7	9	11	13	15	18	20
21	82805	82827	82849	82871	82893	82915	82937	38	2	4	7	9	11	13	15	18	20
22	82937	82959	82981	83003	83025	83046	83068	37	2	4	7	9	11	13	15	18	20
23	83068	83090	83112	83134	83155	83177	83199	36	2	4	7	9	11	13	15	18	20
24	83199	83220	83242	83264	83285	83307	83329	35	2	4	6	9	11	13	15	17	19
25	9.83329	83350	83372	83393	83415	83436	83458	34	2	4	6	9	11	13	15	17	19
26	83458	83479	83501	83522	83544	83565	83587	33	2	4	6	9	11	13	15	17	19
27	83587	83608	83629	83651	83672	83694	83715	32	2	4	6	9	11	13	15	17	19
28	83715	83736	83757	83779	83800	83821	83842	31	2	4	6	9	11	13	15	17	19
29	83842	83864	83885	83906	83927	83948	83969	30	2	4	6	8	11	13	15	17	19
30	9.83969	83990	84011	84033	84054	84075	84096	29	2	4	6	8	11	13	15	17	19
31	84096	84117	84138	84159	84179	84200	84221	28	2	4	6	8	11	13	15	17	19
32	84221	84242	84263	84284	84305	84326	84346	27	2	4	6	8	11	13	15	17	19
33	84346	84367	84388	84409	84430	84450	84471	26	2	4	6	8	11	13	15	17	19
34	84471	84492	84512	84533	84554	84574	84595	25	2	4	6	8	10	12	14	16	18
35	9.84595	84616	84636	84657	84677	84698	84718	24	2	4	6	8	10	12	14	16	18
36	84718	84739	84759	84780	84800	84821	84841	23	2	4	6	8	10	12	14	16	18
37	84841	84861	84882	84902	84923	84943	84963	22	2	4	6	8	10	12	14	16	18
38	84963	84984	85004	85024	85044	85065	85085	21	2	4	6	8	10	12	14	16	18
39	85085	85105	85125	85145	85166	85186	85206	20	2	4	6	8	10	12	14	16	18
40	9.85206	85226	85246	85266	85286	85306	85326	19	2	4	6	8	10	12	14	16	18
41	85326	85346	85366	85386	85406	85426	85446	18	2	4	6	8	10	12	14	16	18
42	85446	85466	85486	85506	85526	85546	85565	17	2	4	6	8	10	12	14	16	18
43	85565	85585	85605	85625	85645	85664	85684	16	2	4	6	8	10	12	14	16	18
44	85684	85704	85724	85743	85763	85783	85802	15	2	4	6	8	10	12	14	16	18
45	9.85802	85822	85841	85861	85881	85900	85920	14	2	4	6	8	10	12	14	16	18
46	85920	85939	85959	85978	85998	86017	86937	13	2	4	6	8	10	12	14	16	18
47	86037	86056	86076	86095	86114	86134	86153	12	2	4	6	8	10	12	14	16	18
48	86153	86172	86192	86211	86230	86250	86269	11	2	4	6	8	10	12	14	16	18
49	86269	86288	86307	86327	86346	86365	86384	10	2	4	6	8	10	12	14	16	18
50	9.86384	86403	86423	86442	86461	86480	86499	9	2	4	6	8	9	11	13	15	17
51	86499	86518	86537	86556	86575	86594	86613	8	2	4	6	8	9	11	13	15	17
52	86613	86632	86651	86670	86689	86708	86727	7	2	4	6	8	9	11	13	15	17
53	86727	86746	86764	86783	86802	86821	86840	6	2	4	6	8	9	11	13	15	17
54	86840	86858	86877	86896	86915	86933	86952	5	2	4	6	8	9	11	13	15	17
55	9.86952	86971	86990	87008	87027	87045	87064	4	2	4	6	8	9	11	13	15	17
56	87064	87083	87101	87120	87138	87157	87175	3	2	4	6	7	9	11	13	15	17
57	87175	87194	87212	87231	87249	87268	87286	2	2	4	6	7	9	11	13	15	17
58	87286	87305	87323	87341	87360	87378	87396	1	2	4	6	7	9	11	13	15	17
59	87396	87415	87433	87451	87470	87488	87506	0	2	4	6	7	9	11	13	15	17
	60s.	50s.	40s.	30s.	20s.	10s.	0s.	M.	1s.	2s.	3s.	4s.	5s.	6s.	7s.	8s.	9s.
	16 HOURS.								PROPORTIONAL PARTS FOR SECONDS.								

TABLE XIII.

LOGARITHMS of the APPARENT TIME, or HORARY ANGLE.

	8 HOURS.								PROPORTIONAL PARTS FOR SECONDS.								
M.	s. 0	s. 10	s. 20	s. 30	s. 40	s. 50	s. 60		s. 1	s. 2	s. 3	s. 4	s. 5	s. 6	s. 7	s. 8	s. 9
0	9.87506	87524	87543	87561	87579	87597	87615	59	2	4	5	7	9	11	13	14	16
1	87615	87633	87652	87670	87688	87706	87724	58	2	4	5	7	9	11	13	14	16
2	87724	87742	87760	87778	87796	87814	87832	57	2	4	5	7	9	11	13	14	16
3	87832	87850	87868	87886	87904	87921	87939	56	2	4	6	7	9	11	13	14	16
4	87939	87957	87975	87993	88011	88028	88046	55	2	4	5	7	9	11	13	14	16
5	9.88046	88064	88082	88100	88117	88135	88153	54	2	4	5	7	9	11	13	14	16
6	88153	88170	88188	88206	88223	88241	88259	53	2	3	5	7	9	11	12	14	16
7	88259	88276	88294	88311	88329	88346	88364	52	2	3	5	7	9	11	12	14	16
8	88364	88381	88399	88416	88434	88151	88469	51	2	3	5	7	9	11	12	14	16
9	88469	88486	88503	88521	88538	88556	88573	50	2	3	5	7	9	11	12	14	16
10	9.88573	88590	88607	88625	88642	88659	88677	49	2	3	5	7	8	10	12	14	15
11	88677	88694	88711	88728	88745	88763	88780	48	2	3	5	7	8	10	12	14	15
12	88780	88797	88814	88831	88848	88865	88882	47	2	3	5	7	8	10	12	14	15
13	88882	88899	88916	88933	88950	88967	88984	46	2	3	5	7	8	10	12	14	15
14	88984	89001	89018	89035	89052	89069	89086	45	2	3	5	7	8	10	12	14	15
15	9.89086	89103	89120	89137	89153	89170	89187	44	2	3	5	7	8	10	12	14	15
16	89187	89204	89221	89237	89254	89271	89287	43	2	3	5	7	8	10	12	14	15
17	89287	89304	89321	89338	89354	89371	89387	42	2	3	5	7	8	10	12	14	15
18	89387	89404	89421	89438	89454	89470	89487	41	2	3	5	7	8	10	12	13	15
19	89487	89503	89520	89536	89553	89569	89586	40	2	3	5	7	8	10	12	13	15
20	9.89586	89602	89619	89635	89651	89668	89684	39	2	3	5	7	8	10	12	13	15
21	89684	89701	89717	89733	89749	89766	89782	38	2	3	5	7	8	10	12	13	15
22	89782	89798	89815	89831	89847	89863	89879	37	2	3	5	7	8	10	12	13	15
23	89879	89896	89912	89928	89944	89960	89976	36	2	3	5	6	8	10	11	13	14
24	89976	89992	90008	90024	90040	90056	90072	35	2	3	5	6	8	10	11	13	14
25	9.90072	90088	90104	90120	90136	90152	90168	34	2	3	5	6	8	10	11	13	14
26	90168	90184	90200	90216	90232	90248	90263	33	2	3	5	6	8	10	11	13	14
27	90263	90279	90295	90311	90327	90342	90358	32	2	3	5	6	8	10	11	13	14
28	90358	90374	90390	90405	90421	90437	90452	31	2	3	5	6	8	10	11	13	14
29	90452	90468	90484	90499	90515	90531	90546	30	2	3	5	6	8	10	11	13	14
30	9.90546	90562	90577	90593	90608	90624	90639	29	2	3	5	6	8	9	11	12	14
31	90639	90655	90670	90686	90701	90717	90732	28	2	3	5	6	8	9	11	12	14
32	90732	90747	90763	90778	90794	90809	90824	27	2	3	5	6	8	9	11	12	14
33	90824	90840	90855	90870	90885	90901	90916	26	2	3	5	6	8	9	11	12	14
34	90916	90931	90946	90961	90977	90992	91007	25	2	3	5	6	8	9	11	12	14
35	9.91007	91022	91037	91052	91067	91083	91098	24	2	3	4	6	7	9	10	12	14
36	91098	91113	91128	91143	91158	91173	91188	23	2	3	4	6	7	9	10	12	14
37	91188	91203	91218	91233	91248	91262	91277	22	2	3	4	6	7	9	10	12	14
38	91277	91292	91307	91322	91337	91352	91367	21	2	3	4	6	7	9	10	12	14
39	91367	91381	91396	91411	91426	91440	91455	20	2	3	4	6	7	9	10	12	14
40	9.91455	91470	91485	91499	91514	91529	91543	19	1	3	4	6	7	9	10	12	13
41	91543	91558	91573	91587	91602	91616	91631	18	1	3	4	6	7	9	10	12	13
42	91631	91645	91660	91674	91689	91703	91718	17	1	3	4	6	7	9	10	12	13
43	91718	91732	91747	91761	91776	91790	91805	16	1	3	4	6	7	9	10	12	13
44	91805	91819	91833	91848	91862	91876	91891	15	1	3	4	6	7	9	10	12	13
45	9.91891	91905	91919	91034	91948	91962	91976	14	1	3	4	6	7	8	10	11	13
46	91976	91991	92005	92019	92033	92047	92061	13	1	3	4	6	7	8	10	11	13
47	92061	92076	92090	92104	92118	92132	92146	12	1	3	4	6	7	8	10	11	13
48	92146	92160	92174	92188	92202	92216	92230	11	1	3	4	6	7	8	10	11	13
49	92230	92244	92258	92272	92286	92300	92314	10	1	3	4	6	7	8	10	11	13
50	9.92314	92328	92342	92355	92369	92383	92397	9	1	3	4	6	7	8	10	11	13
51	92397	92411	92425	92438	92452	92466	92480	8	1	3	4	6	7	8	10	11	13
52	92480	92493	92507	92521	92534	92548	92562	7	1	3	4	5	7	8	9	11	12
53	92562	92575	92589	92603	92616	92630	92643	6	1	3	4	5	7	8	9	11	12
54	92643	92657	92670	92684	92698	92711	92725	5	1	3	4	5	7	8	9	11	12
55	9.92725	92738	92751	92765	92778	92792	92805	4	1	3	4	5	7	8	9	11	12
56	92805	92819	92832	92845	92859	92872	92885	3	1	3	4	5	7	8	9	11	12
57	92885	92899	92912	92925	92939	92952	92965	2	1	3	4	5	7	8	9	11	12
58	92965	92978	92992	93005	93018	93031	93044	1	1	3	4	5	7	8	9	10	12
59	93044	93057	93071	93084	93097	93110	93123	0	1	3	4	5	7	8	9	10	12
	60s.	50s.	40s.	30s.	20s.	10s.	0s.	M.	1s.	2s.	3s.	4s.	5s.	6s.	7s.	8s.	9s.
	15 HOURS.								PROPORTIONAL PARTS FOR SECONDS.								

TABLE XIV.

LOGARITHMS of the MOON'S HORIZONTAL PARALLAX.

	MOON'S HORIZONTAL PARALLAX.									
S.	53′	54′	55′	56′	57′	58′	59′	60′	61′	S.
0	0.0710	0.0629	0.0549	0.0471	0.0394	0.0318	0.0244	0.0171	0.0099	0
1	0709	0627	0548	0470	0393	0317	0243	0170	0098	1
2	0707	0626	0546	0468	0391	0316	0242	0169	0097	2
3	0706	0625	0545	0467	0390	0315	0241	0168	0096	3
4	0704	0623	0544	0466	0389	0313	0239	0166	0095	4
5	0.0703	0.0622	0.0542	0.0464	0.0388	0.0312	0.0238	0.0165	0.0093	5
6	0702	0621	0541	0463	0386	0311	0237	0164	0092	6
7	0700	0619	0540	0462	0385	0310	0236	0163	0091	7
8	0699	0618	0539	0460	0384	0308	0234	0162	0090	8
9	0698	0617	0537	0459	0383	0307	0233	0160	0089	9
10	0.0696	0.0615	0.0536	0.0458	0.0381	0.0306	0.0232	0.0159	0.0088	10
11	0695	0614	0535	0457	0380	0305	0231	0158	0086	11
12	0694	0613	0533	0455	0379	0303	0230	0157	0085	12
13	0692	0611	0532	0454	0377	0302	0228	0156	0084	13
14	0691	0610	0531	0453	0376	0301	0227	0154	0083	14
15	0.0690	0.0609	0.0529	0.0451	0.0375	0.0300	0.0226	0.0153	0.0082	15
16	0688	0607	0528	0450	0374	0299	0225	0152	0080	16
17	0687	0606	0527	0449	0372	0297	0223	0151	0079	17
18	0685	0605	0525	0448	0371	0296	0222	0150	0078	18
19	0684	0603	0524	0446	0370	0295	0221	0148	0077	19
20	0.0683	0.0602	0.0523	0.0445	0.0369	0.0294	0.0220	0.0147	0.0076	20
21	0681	0601	0522	0444	0367	0292	0219	0146	0075	21
22	0680	0599	0520	0442	0366	0291	0217	0145	0073	22
23	0678	0598	0519	0441	0365	0290	0216	0144	0072	23
24	0677	0597	0518	0440	0364	0289	0215	0142	0071	24
25	0.0676	0.0595	0.0516	0.0439	0.0362	0.0287	0.0214	0.0141	0.0070	25
26	0674	0594	0515	0437	0361	0286	0212	0140	0069	26
27	0673	0593	0514	0436	0360	0285	0211	0139	0068	27
28	0672	0591	0512	0435	0359	0284	0210	0138	0066	28
29	0670	0590	0511	0433	0357	0282	0209	0136	0065	29
30	0.0669	0.0589	0.0510	0.0432	0.0356	0.0281	0.0208	0.0135	0.0064	30
31	0668	0587	0508	0431	0355	0280	0206	0134	0063	31
32	0666	0586	0507	0430	0353	0279	0205	0133	0062	32
33	0665	0585	0506	0428	0352	0277	0204	0132	0060	33
34	0664	0583	0505	0427	0351	0276	0203	0130	0059	34
35	0.0662	0.0582	0.0503	0.0426	0.0350	0.0275	0.0201	0.0129	0.0058	35
36	0661	0581	0502	0425	0349	0274	0200	0128	0057	36
37	0660	0579	0501	0423	0347	0273	0199	0127	0056	37
38	0658	0578	0499	0422	0346	0271	0198	0126	0055	38
39	0657	0577	0498	0421	0345	0270	0197	0124	0053	39
40	0.0655	0.0575	0.0497	0.0419	0.0343	0.0269	0.0195	0.0123	0.0052	40
41	0654	0574	0495	0418	0342	0268	0194	0122	0051	41
42	0653	0573	0494	0417	0341	0266	0193	0121	0050	42
43	0651	0571	0493	0416	0340	0265	0192	0120	0049	43
44	0650	0570	0492	0414	0338	0264	0191	0118	0048	44
45	0.0649	0.0569	0.0490	0.0413	0.0337	0.0263	0.0189	0.0117	0.0046	45
46	0648	0568	0489	0412	0336	0261	0188	0116	0045	46
47	0646	0566	0188	0411	0335	0260	0187	0115	0044	47
48	0645	0565	0486	0409	0333	0259	0186	0114	0043	48
49	0644	0564	0485	0408	0332	0258	0185	0112	0042	49
50	0.0642	0.0562	0.0484	0.0407	0.0331	0.0256	0.0183	0.0111	0.0040	50
51	0641	0561	0482	0405	0330	0255	0182	0110	0039	51
52	0639	0560	0481	0404	0328	0254	0181	0109	0038	52
53	0638	0558	0480	0403	0327	0253	0179	0108	0037	53
54	0637	0557	0479	0402	0326	0252	0178	0107	0036	54
55	0.0635	0.0556	0.0477	0.0400	0.0325	0.0250	0.0177	0.0105	0.0035	55
56	0634	0554	0476	0399	0323	0249	0176	0104	0033	56
57	0633	0553	0475	0398	0322	0248	0175	0103	0032	57
58	0631	0552	0473	0396	0321	0247	0174	0102	0031	58
59	0630	0550	0472	0395	0320	0245	0172	0101	0030	59
S.	53′	54′	55′	56′	57′	58′	59′	60′	61′	S.

TABLE XV.

LOGARITHMS of the APPARENT ALTITUDES.

APPARENT ALTITUDES.

M.	5°	6°	7°	8°	9°	10°	11°	12°	13°	14°	15°	16°	M.
0	1.5197	4408	3741	3164	2657	2203	1794	1421	1079	0763	0470	1.0197	0
1	5183	4396	3731	3155	2649	2196	1788	1415	1074	0758	0465	0192	1
2	5168	4384	3721	3147	2641	2189	1781	1409	1068	0753	0461	0188	2
3	5154	4372	3710	3138	2633	2182	1775	1403	1063	0748	0456	0183	3
4	5140	4360	3700	3129	2625	2175	1768	1398	1957	0743	0451	0179	4
5	1.5125	4348	3690	3120	2617	2168	1762	1392	1052	0738	0447	1.0175	5
6	5111	4336	3680	3111	2609	2161	1755	1386	1046	0733	0442	0170	6
7	5097	4324	3670	3102	2601	2153	1749	1380	1041	0728	0437	0166	7
8	5083	4313	3660	3093	2593	2146	1742	1374	1036	0723	0433	0162	8
9	5069	4301	3649	3084	2585	2139	1736	1368	1030	0718	0428	0157	9
10	1.5055	4289	3639	3075	2578	2132	1730	1362	1025	0713	0423	1.0153	10
11	5041	4277	3629	3067	2570	2125	1723	1356	1019	0708	0418	0148	11
12	5027	4268	3619	3058	2562	2118	1717	1350	1014	0703	0414	0144	12
13	5013	4254	3609	3049	2554	2111	1710	1345	1009	0698	0409	0140	13
14	4999	4243	3599	3040	2546	2104	1704	1339	1003	0693	0405	0135	14
15	1.4986	4231	3589	3032	2539	2097	1698	1333	0998	0688	0400	1.0131	15
16	4972	4220	3580	3023	2531	2090	1691	1327	0992	0683	0395	0127	16
17	4958	4208	3570	3014	2523	2083	1685	1321	0987	0678	0391	0122	17
18	4945	4197	3560	3006	2515	2076	1679	1316	0982	0673	0386	0118	18
19	4931	4185	3550	2997	2508	2069	1672	1310	0976	0668	0381	0114	19
20	1.4918	4174	3540	2988	2500	2062	1666	1304	0971	0663	0377	1.0109	20
21	4904	4162	3530	2980	2492	2055	1660	1298	0966	0658	0372	0105	21
22	4891	4151	3520	2971	2485	2049	1653	1292	0960	0653	0368	0101	22
23	4877	4140	3511	2963	2477	2042	1647	1287	0955	0648	0363	0097	23
24	4864	4128	3501	2954	2469	2035	1641	1281	0950	0643	0358	0092	24
25	1.4850	4117	3491	2945	2462	2028	1635	1275	0945	0638	0354	1.0088	25
26	4837	4106	3482	2937	2454	2021	1628	1269	0939	0634	0349	0084	26
27	4824	4095	3472	2928	2447	2014	1622	1264	0934	0629	0345	0079	27
28	4811	4084	3462	2920	2439	2007	1616	1258	0929	0624	0340	0075	28
29	4797	4073	3453	2911	2431	2000	1610	1252	0923	0619	0336	0071	29
30	1.4784	4061	3443	2903	2424	1994	1604	1247	0918	0614	0331	1.0067	30
31	4771	4050	3433	2894	2416	1987	1597	1241	0913	0609	0326	0062	31
32	4758	4039	3424	2886	2409	1980	1591	1235	0908	0604	0322	0058	32
33	4745	4028	3414	2878	2401	1973	1585	1230	0902	0599	0317	0054	33
34	4732	4017	3405	2869	2394	1966	1579	1224	0897	0595	0313	0050	34
35	1.4719	4006	3395	2861	2386	1960	1573	1218	0892	0590	0308	1.0045	35
36	4706	3995	3386	2853	2379	1953	1566	1213	0887	0585	0304	0041	36
37	4693	3984	3376	2844	2371	1946	1560	1207	0881	0580	0299	0037	37
38	4681	3974	3367	2836	2364	1939	1554	1201	0876	0575	0295	0033	38
39	4668	3963	3358	2828	2357	1933	1548	1196	0871	0570	0290	0028	39
40	1.4655	3952	3348	2819	2349	1926	1542	1190	0866	0565	0286	1.0024	40
41	4642	3941	3339	2811	2342	1919	1536	1184	0861	0561	0281	0020	41
42	4630	3930	3329	2803	2334	1913	1530	1179	0855	0556	0277	0016	42
43	4617	3920	3320	2794	2327	1906	1523	1173	0850	0551	0272	0012	43
44	4604	3909	3311	2786	2320	1899	1517	1168	0845	0546	0268	0007	44
45	1.4592	3898	3301	2778	2312	1893	1511	1162	0840	0541	0263	1.0003	45
46	4579	3888	3292	2770	2305	1886	1505	1156	0835	0537	0259	0.9999	46
47	4567	3877	3283	2762	2297	1879	1499	1151	0830	0532	0254	9995	47
48	4554	3866	3274	2753	2290	1873	1493	1145	0825	0527	0250	9991	48
49	4542	3856	3264	2745	2283	1866	1487	1140	0819	0522	0245	9986	49
50	1.4530	3845	3255	2737	2276	1860	1481	1134	0814	0517	0241	0.9982	50
51	4517	3835	3246	2729	2268	1853	1475	1129	0809	0513	0236	9978	51
52	4505	3824	3237	2721	2261	1846	1469	1123	0804	0508	0232	9974	52
53	4493	3814	3228	2713	2254	1840	1463	1118	0799	0503	0228	9970	53
54	4480	3803	3219	2705	2247	1833	1457	1112	0794	0498	0223	9966	54
55	1.4468	3793	3210	2697	2239	1827	1451	1107	0789	0494	0219	0.9961	55
56	4456	3782	3201	2689	2232	1820	1445	1101	0784	0489	0214	9957	56
57	4444	3772	3191	2681	2225	1814	1439	1096	0778	0484	0210	9953	57
58	4432	3762	3182	2673	2218	1807	1433	1090	0773	0479	0205	9949	58
59	4420	3751	3173	2665	2210	1801	1427	1085	0768	0475	0201	9945	59
M.	5°	6°	7°	8°	9°	10°	11°	12°	13°	14°	15°	16°	M.

APPARENT ALTITUDES.

TABLE XV.

LOGARITHMS of the APPARENT ALTITUDES.

M.	APPARENT ALTITUDES.												M.
	° 17	° 18	° 19	° 20	° 21	° 22	° 23	° 24	° 25	° 26	° 27	° 28	
0	0.9941	9700	9474	9259	9057	8864	8681	8507	8341	8182	8030	7884	0
1	9937	9696	9470	9256	9053	8861	8678	8504	8338	8179	8027	7882	1
2	9932	9692	9466	9253	9050	8858	8675	8501	8335	8176	8025	7879	2
3	9928	9689	9463	9249	9047	8855	8672	8498	8332	8174	8022	7877	3
4	9924	9685	9459	9246	9044	8852	8669	8496	8330	8171	8020	7874	4
5	0.9920	9681	9455	9242	9040	8849	8666	8493	8327	8169	8017	7872	5
6	9916	9677	9452	9239	9037	8846	8663	8490	8324	8166	8015	7870	6
7	9912	9673	9448	9235	9034	8842	8660	8487	8322	8163	8012	7867	7
8	9908	9669	9444	9232	9030	8839	8657	8484	8319	8161	8010	7865	8
9	9904	9665	9441	9228	9027	8836	8655	8481	8316	8158	8007	7863	9
10	0.9900	9661	9437	9225	9024	8833	8652	8479	8314	8156	8005	7860	10
11	9895	9658	9433	9221	9021	8830	8649	8476	8311	8153	8002	7858	11
12	9891	9654	9430	9218	9017	8827	8646	8473	8308	8151	8000	7856	12
13	9887	9650	9426	9215	9014	8824	8643	8470	8305	8148	7997	7853	13
14	9883	9646	9423	9211	9011	8821	8640	8467	8303	8145	7995	7851	14
15	0.9879	9642	9419	9208	9008	8818	8637	8465	8300	8143	7993	7848	15
16	9875	9638	9415	9204	9004	8815	8634	8462	8297	8140	7990	7846	16
17	9871	9635	9412	9201	9001	8811	8631	8459	8295	8138	7988	7844	17
18	9867	9631	9408	9198	8998	8898	8628	8456	8292	8135	7985	7841	18
19	9863	9627	9404	9194	8995	8805	8625	8453	8289	8133	7983	7839	19
20	0.9859	9623	9401	9191	8991	8802	8622	8451	8287	8130	7980	7837	20
21	9855	9619	9397	9187	8988	8799	8619	8448	8284	8128	7978	7834	21
22	9851	9616	9394	9184	8985	8796	8616	8445	8281	8125	7975	7832	22
23	9847	9612	9390	9180	8982	8793	8613	8442	8279	8123	7973	7830	23
24	9843	9608	9387	9177	8979	8790	8610	8439	8276	8120	7971	7827	24
25	0.9839	9604	9383	9174	8975	8787	8608	8437	8273	8117	7968	7825	25
26	9835	9600	9379	9170	8972	8784	8605	8434	8271	8115	7966	7823	26
27	9831	9597	9376	9167	8969	8781	8602	8431	8268	8112	7963	7820	27
28	9827	9593	9372	9164	8966	8778	8599	8428	8265	8110	7961	7818	28
29	9823	9589	9369	9160	8962	8775	8596	8425	8263	8107	7958	7816	29
30	0.9819	9585	9365	9157	8959	8772	8593	8423	8260	8105	7956	7813	30
31	9815	9581	9361	9153	8956	8769	8590	8420	8258	8102	7954	7811	31
32	9811	9578	9358	9150	8953	8766	8587	8417	8255	8100	7951	7809	32
33	9807	9574	9354	9147	8950	8762	8584	8414	8252	8097	7949	7806	33
34	9803	9570	9351	9143	8946	8759	8581	8412	8250	8095	7946	7804	34
35	0.9799	9566	9347	9140	8943	8756	8578	8409	8247	8092	7944	7802	35
36	9795	9563	9344	9137	8940	8753	8576	8406	8244	8090	7941	7799	36
37	9791	9559	9340	9133	8937	8750	8573	8403	8242	8087	7939	7797	37
38	9787	9555	9337	9130	8934	8747	8570	8401	8239	8085	7937	7795	38
39	9783	9551	9333	9126	8930	8744	8567	8398	8236	8082	7934	7792	39
40	0.9779	9548	9330	9123	8927	8741	8564	8395	8234	8079	7932	7790	40
41	9775	9544	9326	9120	8924	8738	8561	8392	8231	8077	7929	7788	41
42	9771	9540	9322	9116	8921	8735	8558	8390	8229	8074	7927	7786	42
43	9767	9536	9319	9113	8918	8732	8555	8387	8226	8072	7925	7783	43
44	9763	9533	9315	9110	8915	8729	8553	8384	8223	8069	7922	7781	44
45	0.9759	9529	9312	9106	8911	8726	8550	8381	8221	8067	7920	7779	45
46	9755	9525	9308	9103	8908	8723	8547	8379	8218	8064	7917	7776	46
47	9751	9522	9305	9100	8905	8720	8544	8376	8215	8062	7915	7774	47
48	9747	9518	9301	9096	8902	8717	8541	8373	8213	8059	7913	7772	48
49	9743	9514	9298	9093	8899	8714	8538	8370	8210	8057	7910	7769	49
50	0.9739	9510	9294	9090	8896	8711	8535	8368	8208	8054	7908	7767	50
51	9735	9507	9291	9086	8892	8708	8532	8365	8205	8052	7905	7765	51
52	9731	9503	9287	9083	8889	8705	8530	8362	8202	8049	7903	7763	52
53	9727	9499	9284	9080	8886	8702	8527	8360	8200	8047	7901	7760	53
54	9724	9496	9280	9077	8883	8699	8524	8357	8197	8044	7898	7758	54
55	0.9720	9492	9277	9073	8880	8696	8521	8354	8195	8042	7896	7756	55
56	9716	9488	9273	9070	8877	8693	8518	8351	8192	8039	7893	7753	56
57	9712	9485	9270	9067	8874	8690	8515	8349	8189	8037	7891	7751	57
58	9708	9481	9266	9063	8870	8687	8513	8346	8187	8034	7889	7749	58
59	9704	9477	9263	9060	8867	8684	8510	8343	8184	8032	7886	7747	59
M.	17°	18°	19°	20°	21°	22°	23°	24°	25°	26°	27°	28°	M.
	APPARENT ALTITUDES.												

TABLE XV.

LOGARITHMS of the APPARENT ALTITUDES.

	APPARENT ALTITUDES.												
M.	29°	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	M.
0	0.7744	7610	7482	7358	7239	7124	7014	6908	6805	6707	6611	6519	0
1	7742	7608	7479	7356	7237	7123	7012	6906	6804	6705	6610	6518	1
2	7740	7606	7477	7354	7235	7121	7010	6904	6802	6703	6608	6516	2
3	7737	7604	7475	7352	7233	7119	7009	6903	6800	6702	6607	6515	3
4	7735	7602	7473	7350	7231	7117	7007	6901	6798	6700	6605	6513	4
5	0.7733	7599	7471	7348	7229	7115	7005	6899	6796	6699	6603	6512	5
6	7731	7597	7469	7346	7227	7113	7003	6897	6795	6697	6602	6510	6
7	7728	7595	7467	7344	7225	7111	7001	6896	6794	6695	6600	6509	7
8	7726	7593	7465	7342	7223	7109	7000	6894	6792	6694	6599	6507	8
9	7724	7591	7463	7340	7221	7108	6998	6892	6790	6692	6597	6506	9
10	0.7722	7588	7461	7338	7220	7106	6996	6890	6789	6690	6596	6504	10
11	7719	7586	7459	7336	7218	7104	6994	6889	6787	6689	6594	6503	11
12	7717	7584	7456	7334	7216	7102	6993	6887	6785	6687	6593	6501	12
13	7715	7582	7454	7332	7214	7100	6991	6885	6784	6686	6591	6500	13
14	7713	7580	7452	7330	7212	7098	6989	6884	6782	6684	6590	6498	14
15	0.7710	7578	7450	7328	7210	7096	6987	6882	6780	6682	6588	6497	15
16	7708	7575	7448	7326	7208	7095	6985	6880	6779	6681	6586	6495	16
17	7706	7573	7446	7324	7206	7093	6984	6878	6777	6679	6585	6494	17
18	7704	7571	7444	7322	7204	7091	6982	6877	6775	6678	6583	6492	18
19	7701	7569	7442	7320	7202	7089	6980	6875	6774	6676	6582	6491	19
20	0.7699	7567	7440	7318	7200	7087	6978	6873	6772	6674	6580	6489	20
21	7697	7565	7438	7316	7198	7085	6976	6872	6770	6673	6579	6488	21
22	7695	7563	7436	7314	7196	7083	6975	6870	6769	6671	6577	6486	22
23	7692	7560	7434	7312	7194	7082	6973	6868	6767	6670	6576	6485	23
24	7690	7558	7432	7310	7193	7080	6971	6866	6765	6668	6574	6483	24
25	0.7688	7556	7429	7308	7191	7078	6969	6865	6764	6666	6573	6482	25
26	7686	7554	7427	7306	7189	7076	6968	6863	6762	6665	6571	6480	26
27	7683	7552	7425	7304	7187	7074	6966	6861	6760	6663	6570	6479	27
28	7681	7550	7423	7302	7185	7072	6964	6860	6759	6662	6568	6478	28
29	7679	7547	7421	7300	7183	7071	6962	6858	6757	6660	6566	6476	29
30	0.7677	7545	7419	7298	7181	7069	6960	6856	6756	6658	6565	6475	30
31	7674	7543	7417	7296	7179	7067	6959	6854	6754	6657	6563	6473	31
32	7672	7541	7415	7294	7177	7065	6957	6853	6752	6655	6562	6472	32
33	7670	7539	7413	7292	7175	7063	6955	6851	6751	6654	6560	6470	33
34	7668	7537	7411	7290	7173	7061	6953	6849	6749	6652	6559	6469	34
35	0.7665	7535	7409	7288	7172	7060	6952	6848	6747	6651	6557	6467	35
36	7663	7532	7407	7286	7170	7058	6950	6846	6746	6649	6556	6466	36
37	7661	7530	7405	7284	7168	7056	6948	6844	6744	6647	6554	6464	37
38	7659	7528	7403	7282	7166	7054	6946	6842	6742	6646	6553	6463	38
39	7657	7526	7401	7280	7164	7052	6945	6841	6741	6644	6551	6461	39
40	0.7654	7524	7399	7278	7162	7050	6943	6839	6739	6643	6550	6460	40
41	7652	7522	7397	7276	7160	7049	6941	6837	6737	6641	6548	6458	41
42	7650	7520	7395	7274	7158	7047	6939	6836	6736	6640	6547	6457	42
43	7648	7518	7392	7272	7156	7045	6938	6834	6734	6638	6545	6455	43
44	7645	7515	7390	7270	7154	7043	6936	6832	6733	6636	6544	6454	44
45	0.7643	7513	7388	7268	7153	7041	6934	6831	6731	6635	6542	6452	45
46	7641	7511	7386	7266	7151	7039	6932	6829	6729	6633	6540	6451	46
47	7639	7509	7384	7264	7149	7038	6931	6827	6728	6632	6539	6450	47
48	7637	7507	7382	7262	7147	7036	6929	6826	6726	6630	6537	6448	48
49	7634	7505	7380	7260	7145	7034	6927	6824	6724	6628	6536	6447	49
50	0.7632	7503	7378	7258	7143	7032	6925	6822	6723	6627	6534	6445	50
51	7630	7501	7376	7256	7141	7030	6924	6820	6721	6625	6533	6444	51
52	7628	7498	7374	7255	7139	7029	6922	6819	6720	6624	6531	6442	52
53	7626	7496	7372	7253	7138	7027	6920	6817	6718	6622	6530	6441	53
54	7623	7494	7370	7251	7136	7025	6918	6815	6716	6621	6528	6439	54
55	0.7621	7492	7368	7249	7134	7023	6917	6814	6715	6619	6527	6438	55
56	7619	7490	7366	7247	7132	7021	6915	6812	6713	6618	6525	6436	56
57	7617	7488	7364	7345	7130	7019	6913	6810	6711	6616	6524	6435	57
58	7615	7486	7362	7243	7128	7018	6911	6809	6710	6614	6522	6433	58
59	7612	7484	7360	7241	7126	7016	6910	6807	6708	6613	6521	6432	59
M.	29°	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	M.
	APPARENT ALTITUDES.												

TABLE XV.

LOGARITHMS of the APPARENT ALTITUDES.

APPARENT ALTITUDES.

M.	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	51°	52°	M.
0	0.6431	6345	6262	6182	6105	6031	5959	5889	5822	5757	5695	5635	0
1	6429	6343	6261	6181	6104	6029	5958	5888	5821	5756	5694	5634	1
2	6428	6342	6259	6180	6103	6028	5956	5887	5820	5755	5693	5633	2
3	6426	6341	6258	6178	6101	6027	5955	5886	5819	5754	5692	5632	3
4	6425	6339	6257	6177	6100	6026	5954	5885	5818	5753	5691	5631	4
5	0.6423	6338	6255	6176	6099	6025	5953	5884	5817	5752	5690	5630	5
6	6422	6336	6254	6174	6098	6023	5952	5882	5816	5751	5689	5629	6
7	6420	6335	6253	6173	6096	6022	5950	5881	5815	5750	5688	5628	7
8	6419	6334	6251	6172	6095	6021	5949	5880	5813	5749	5687	5627	8
9	6418	6332	6250	6171	6094	6020	5948	5879	5812	5748	5686	5626	9
10	0.6416	6331	6249	6169	6093	6018	5947	5878	5811	5747	5685	5625	10
11	6415	6330	6247	6168	6091	6017	5946	5877	5810	5746	5684	5624	11
12	6413	6328	6246	6167	6090	6016	5945	5876	5809	5745	5683	5623	12
13	6412	6327	6245	6165	6089	6015	5943	5875	5808	5744	5682	5622	13
14	6410	6325	6243	6164	6088	6014	5942	5873	5807	5743	5681	5621	14
15	0.6409	6324	6242	6163	6086	6012	5941	5872	5806	5742	5680	5620	15
16	6407	6323	6241	6161	6085	6011	5940	5871	5805	5741	5679	5619	16
17	6406	6321	6239	6160	6084	6010	5939	5870	5804	5740	5678	5618	17
18	6405	6320	6238	6159	6083	6009	5938	5869	5803	5738	5677	5617	18
19	6403	6318	6237	6158	6081	6008	5936	5868	5801	5737	5676	5616	19
20	0.6402	6317	6235	6156	6080	6006	5935	5867	5800	5736	5675	5615	20
21	6400	6316	6234	6155	6079	6005	5934	5866	5799	5735	5674	5614	21
22	6399	6314	6233	6154	6078	6004	5933	5864	5798	5734	5673	5613	22
23	6397	6313	6231	6152	6076	6003	5932	5863	5797	5733	5672	5612	23
24	6396	6311	6230	6151	6075	6002	5931	5862	5796	5732	5671	5611	24
25	0.6394	6310	6229	6150	6074	6000	5929	5861	5795	5731	5670	5610	25
26	6393	6309	6227	6149	6073	5999	5928	5860	5794	5730	5669	5609	26
27	6392	6307	6226	6147	6071	5998	5927	5859	5793	5729	5668	5608	27
28	6390	6306	6225	6146	6070	5997	5926	5858	5792	5728	5667	5607	28
29	6389	6305	6223	6145	6069	5996	5925	5857	5791	5727	5666	5606	29
30	0.6387	6303	6222	6143	6068	5994	5924	5855	5790	5726	5665	5605	30
31	6386	6302	6221	6142	6066	5993	5923	5854	5788	5725	5664	5604	31
32	6384	6300	6219	6141	6065	5992	5921	5853	5787	5724	5663	5603	32
33	6383	6299	6218	6140	6064	5991	5920	5852	5786	5723	5662	5602	33
34	6382	6298	6217	6138	6063	5990	5919	5851	5785	5722	5661	5601	34
35	0.6380	6296	6215	6137	6061	5988	5918	5850	5784	5721	5660	5600	35
36	6379	6295	6214	6136	6060	5987	5917	5849	5783	5720	5659	5600	36
37	6377	6294	6213	6134	6059	5986	5916	5848	5782	5719	5658	5599	37
38	6376	6292	6211	6133	6058	5985	5914	5847	5781	5718	5657	5598	38
39	6375	6291	6210	6132	6056	5984	5913	5845	5780	5717	5656	5597	39
40	0.6373	6289	6209	6131	6055	5982	5912	5844	5779	5716	5655	5596	40
41	6372	6288	6207	6129	6054	5981	5911	5843	5778	5715	5654	5595	41
42	6370	6287	6206	6128	6053	5980	5910	5842	5777	5713	5653	5594	42
43	6369	6285	6205	6127	6051	5979	5909	5841	5776	5712	5652	5593	43
44	6367	6284	6203	6125	6050	5978	5908	5840	5774	5711	5651	5592	44
45	0.6366	6283	6202	6124	6049	5976	5906	5839	5773	5710	5650	5591	45
46	6365	6281	6201	6123	6048	5975	5905	5838	5772	5709	5649	5590	46
47	6363	6280	6199	6122	6047	5974	5904	5837	5771	5708	5648	5589	47
48	6362	6278	6198	6120	6045	5973	5903	5835	5770	5707	5647	5588	48
49	6360	6277	6197	6119	6044	5972	5902	5834	5769	5706	5646	5587	49
50	0.6359	6276	6195	6118	6043	5971	5901	5833	5768	5705	5645	5586	50
51	6358	6274	6194	6117	6042	5969	5900	5832	5767	5704	5644	5585	51
52	6356	6273	6193	6115	6040	5968	5898	5831	5766	5703	5643	5584	52
53	6355	6272	6191	6114	6039	5967	5897	5830	5765	5702	5642	5583	53
54	6353	6270	6190	6113	6038	5966	5896	5829	5764	5701	5641	5582	54
55	0.6352	6269	6189	6111	6037	5965	5895	5828	5763	5700	5640	5581	55
56	6351	6268	6188	6110	6036	5963	5894	5827	5762	5699	5639	5580	56
57	6349	6266	6186	6109	6034	5962	5893	5825	5761	5698	5638	5579	57
58	6348	6265	6185	6108	6033	5961	5892	5824	5760	5697	5637	5578	58
59	6346	6264	6184	6106	6032	5960	5890	5823	5759	5696	5636	5577	59
M.	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	51°	52°	M.

APPARENT ALTITUDES.

TABLE XV.

LOGARITHMS of the APPARENT ALTITUDES.

M.	APPARENT ALTITUDES.												M.
	53°	54°	55°	56°	57°	58°	59°	60°	61°	62°	63°	64°	
0	0.5577	5520	5466	5414	5364	5316	5269	5225	5182	5141	5101	5063	0
1	5576	5520	5465	5413	5363	5315	5269	5224	5181	5140	5101	5063	1
2	5575	5519	5465	5413	5362	5314	5268	5223	5180	5139	5100	5062	2
3	5574	5518	5464	5412	5362	5313	5267	5223	5180	5139	5099	5062	3
4	5573	5517	5463	5411	5361	5313	5266	5222	5179	5138	5099	5061	4
5	0.5572	5516	5462	5410	5360	5312	5266	5221	5178	5137	5098	5060	5
6	5571	5515	5461	5409	5359	5311	5265	5220	5178	5137	5097	5060	6
7	5570	5514	5460	5408	5358	5310	5264	5220	5177	5136	5097	5059	7
8	5569	5513	5459	5407	5358	5309	5263	5219	5176	5135	5096	5058	8
9	5568	5512	5458	5407	5357	5309	5263	5218	5176	5135	5095	5058	9
10	0.5567	5511	5458	5406	5356	5308	5262	5217	5175	5134	5095	5057	10
11	5566	5510	5457	5405	5355	5307	5261	5217	5174	5133	5094	5057	11
12	5565	5509	5456	5404	5354	5306	5260	5216	5173	5133	5093	5056	12
13	5564	5509	5455	5403	5353	5306	5260	5215	5173	5132	5093	5055	13
14	5563	5508	5454	5402	5353	5305	5259	5215	5172	5131	5092	5055	14
15	0.5562	5507	5453	5402	5352	5304	5258	5214	5171	5131	5092	5054	15
16	5561	5506	5452	5401	5351	5303	5257	5213	5171	5130	5091	5054	16
17	5560	5505	5451	5400	5350	5302	5257	5212	5170	5129	5090	5053	17
18	5559	5504	5451	5399	5349	5302	5256	5212	5169	5129	5090	5052	18
19	5559	5503	5450	5398	5349	5301	5255	5211	5169	5128	5089	5052	19
20	0.5558	5502	5449	5397	5348	5300	5254	5210	5168	5127	5088	5051	20
21	5557	5501	5448	5396	5347	5299	5254	5209	5167	5127	5088	5051	21
22	5556	5500	5447	5396	5346	5299	5253	5209	5167	5126	5087	5050	22
23	5555	5499	5446	5395	5345	5298	5252	5208	5166	5125	5087	5049	23
24	5554	5499	5445	5394	5345	5297	5251	5207	5165	5125	5086	5049	24
25	0.5553	5498	5444	5393	5344	5296	5251	5207	5164	5124	5085	5048	25
26	5552	5497	5444	5392	5343	5295	5250	5206	5164	5123	5085	5048	26
27	5551	5496	5443	5391	5312	5295	5249	5205	5163	5123	5084	5047	27
28	5550	5495	5442	5391	5341	5294	5248	5204	5162	5122	5083	5046	28
29	5549	5494	5441	5390	5341	5293	5248	5204	5162	5121	5083	5046	29
30	0.5548	5493	5440	5389	5340	5292	5247	5203	5161	5121	5082	5045	30
31	5547	5492	5439	5388	5339	5292	5246	5202	5160	5120	5081	5045	31
32	5546	5491	5438	5387	5338	5291	5245	5201	5160	5119	5081	5044	32
33	5545	5490	5437	5386	5337	5290	5245	5201	5159	5119	5080	5043	33
34	5544	5490	5437	5386	5336	5289	5244	5200	5158	5118	5080	5043	34
35	0.5544	5489	5436	5385	5336	5288	5243	5199	5158	5117	5079	5042	35
36	5543	5488	5435	5384	5335	5288	5242	5199	5157	5117	5078	5042	36
37	5542	5487	5434	5383	5334	5287	5242	5198	5156	5116	5078	5041	37
38	5541	5486	5433	5382	5333	5286	5241	5197	5156	5115	5077	5040	38
39	5540	5485	5432	5381	5332	5285	5240	5197	5155	5115	5076	5040	39
40	0.5539	5484	5431	5381	5332	5285	5239	5196	5154	5114	5076	5039	40
41	5538	5483	5431	5380	5331	5284	5239	5195	5153	5113	5075	5039	41
42	5537	5482	5430	5379	5330	5283	5238	5194	5153	5113	5075	5038	42
43	5536	5481	5429	5378	5329	5282	5237	5194	5152	5112	5074	5037	43
44	5535	5481	5428	5377	5328	5282	5236	5193	5151	5112	5073	5037	44
45	0.5534	5480	5427	5376	5328	5281	5236	5192	5151	5111	5073	5036	45
46	5533	5479	5426	5376	5327	5280	5235	5192	5150	5110	5072	5036	46
47	5532	5478	5425	5375	5326	5279	5234	5191	5149	5110	5071	5035	47
48	5531	5477	5425	5374	5325	5278	5233	5190	5149	5109	5071	5034	48
49	5531	5476	5424	5373	5325	5278	5233	5190	5148	5108	5070	5034	49
50	0.5530	5475	5423	5372	5324	5277	5232	5189	5147	5108	5070	5033	50
51	5529	5474	5422	5371	5323	5276	5231	5188	5147	5107	5069	5033	51
52	5528	5473	5421	5371	5322	5275	5230	5187	5146	5106	5068	5032	52
53	5527	5473	5420	5370	5321	5275	5230	5187	5145	5106	5068	5031	53
54	5526	5472	5419	5369	5321	5274	5229	5186	5145	5105	5067	5031	54
55	0.5525	5471	5419	5368	5320	5273	5228	5185	5144	5104	5066	5030	55
56	5524	5470	5418	5367	5319	5272	5228	5185	5143	5104	5066	5030	56
57	5523	5469	5417	5367	5318	5272	5227	5184	5143	5103	5065	5029	57
58	5522	5468	5416	5366	5317	5271	5226	5183	5142	5102	5065	5028	58
59	5521	5467	5415	5365	5317	5270	5225	5183	5141	5102	5064	5028	59
M.	53°	54°	55°	56°	57°	58°	59°	60°	61°	62°	63°	64°	M.
	APPARENT ALTITUDES												

TABLE XV.

LOGARITHMS of the APPARENT ALTITUDES.

APPARENT ALTITUDES.

M.	65°	66°	67°	68°	69°	70°	71°	72°	73°	74°	75°	76°	M.
0	0.5027	4993	4960	4928	4898	4870	4843	4818	4794	4772	4751	4731	0
1	5027	4992	4959	4928	4898	4870	4843	4818	4794	4771	4750	4731	1
2	5026	4992	4959	4927	4898	4869	4842	4817	4793	4771	4750	4730	2
3	5025	4991	4958	4927	4897	4869	4842	4817	4793	4771	4750	4730	3
4	5025	4990	4958	4926	4897	4868	4842	4816	4792	4770	4749	4730	4
5	0.5024	4990	4957	4926	4896	4868	4841	4816	4792	4770	4749	4729	5
6	5024	4989	4956	4925	4896	4867	4841	4815	4792	4769	4749	4729	6
7	5023	4989	4956	4925	4895	4867	4840	4815	4791	4769	4748	4729	7
8	5023	4988	4955	4924	4895	4866	4840	4815	4791	4769	4748	4728	8
9	5022	4988	4955	4924	4894	4866	4839	4814	4791	4768	4748	4728	9
10	0.5021	4987	4954	4923	4894	4866	4839	4814	4790	4768	4747	4728	10
11	5021	4987	4954	4923	4893	4865	4839	4813	4790	4768	4747	4728	11
12	5020	4986	4953	4922	4893	4865	4838	4813	4789	4767	4747	4727	12
13	5020	4985	4953	4922	4892	4864	4838	4813	4789	4767	4746	4727	13
14	5019	4985	4952	4921	4892	4864	4837	4812	4789	4767	4746	4727	14
15	0.5018	4984	4952	4921	4891	4863	4837	4812	4788	4766	4746	4726	15
16	5018	4984	4951	4920	4891	4863	4836	4811	4788	4766	4745	4726	16
17	5017	4983	4951	4920	4890	4862	4836	4811	4788	4765	4745	4726	17
18	5017	4983	4950	4919	4890	4862	4836	4811	4787	4765	4745	4725	18
19	5016	4982	4950	4919	4889	4861	4835	4810	4787	4765	4744	4725	19
20	0.5016	4982	4949	4918	4889	4861	4835	4810	4786	4764	4744	4725	20
21	5015	4981	4949	4918	4888	4861	4834	4809	4786	4764	4744	4724	21
22	5014	4980	4948	4917	4888	4860	4834	4809	4786	4764	4743	4724	22
23	5014	4980	4948	4917	4887	4860	4833	4809	4785	4763	4743	4724	23
24	5013	4979	4947	4916	4887	4859	4833	4808	4785	4763	4743	4724	24
25	0.5013	4979	4946	4916	4886	4859	4833	4808	4785	4763	4742	4723	25
26	5012	4978	4946	4915	4886	4858	4832	4807	4784	4762	4742	4723	26
27	5011	4978	4945	4915	4886	4858	4832	4807	4784	4762	4742	4723	27
28	5011	4977	4945	4914	4885	4857	4831	4807	4784	4762	4741	4722	28
29	5010	4977	4944	4914	4885	4857	4831	4806	4783	4761	4741	4722	29
30	0.5010	4976	4944	4913	4884	4857	4830	4806	4783	4761	4741	4722	30
31	5009	4975	4943	4913	4884	4856	4830	4805	4782	4761	4740	4721	31
32	5009	4975	4943	4912	4883	4856	4830	4805	4782	4760	4740	4721	32
33	5008	4974	4942	4912	4883	4855	4829	4805	4782	4760	4740	4721	33
34	5007	4974	4942	4911	4882	4855	4829	4804	4781	4760	4739	4720	34
35	0.5007	4973	4941	4911	4882	4854	4828	4804	4781	4759	4739	4720	35
36	5006	4973	4941	4910	4881	4854	4828	4803	4780	4759	4739	4720	36
37	5096	4972	4940	4910	4881	4853	4827	4803	4780	4758	4738	4720	37
38	5005	4972	4940	4909	4880	4853	4827	4803	4780	4758	4738	4719	38
39	5005	4971	4939	4909	4880	4853	4827	4802	4779	4758	4738	4719	39
40	0.5004	4971	4939	4908	4879	4852	4826	4802	4779	4757	4737	4719	40
41	5003	4970	4938	4908	4879	4852	4826	4801	4779	4757	4737	4718	41
42	5003	4969	4938	4907	4878	4851	4825	4801	4778	4757	4737	4718	42
43	5002	4969	4937	4907	4878	4851	4825	4801	4778	4756	4736	4718	43
44	5002	4968	4937	4906	4878	4850	4825	4800	4777	4756	4736	4717	44
45	0.5001	4968	4936	4906	4877	4850	4824	4800	4777	4756	4736	4717	45
46	5001	4967	4936	4905	4877	4849	4824	4799	4777	4755	4735	4717	46
47	5000	4967	4935	4905	4876	4849	4823	4799	4776	4755	4735	4717	47
48	4999	4966	4934	4904	4876	4849	4823	4799	4776	4755	4735	4716	48
49	4999	4966	4934	4904	4875	4848	4822	4798	4776	4754	4734	4716	49
50	0.4998	4965	4933	4903	4875	4848	4822	4798	4775	4754	4734	4716	50
51	4998	4965	4933	4903	4874	4847	4822	4798	4775	4754	4734	4715	51
52	4997	4964	4932	4902	4874	4847	4821	4797	4774	4753	4733	4715	52
53	4997	4963	4932	4902	4873	4846	4821	4797	4774	4753	4733	4715	53
54	4996	4963	4931	4901	4873	4846	4820	4796	4774	4753	4733	4715	54
55	0.4996	4962	4931	4901	4872	4845	4820	4796	4773	4752	4733	4714	55
56	4995	4962	4930	4900	4872	4845	4820	4796	4773	4752	4732	4714	56
57	4994	4961	4930	4900	4872	4845	4819	4795	4773	4752	4732	4714	57
58	4994	4961	4929	4899	4871	4844	4819	4795	4772	4751	4732	4713	58
59	4993	4960	4929	4899	4871	4844	4818	4794	4772	4751	4731	4713	59
M.	65°	66°	67°	68°	69°	70°	71°	72°	73°	74°	75°	76°	M.

APPARENT ALTITUDES.

TABLE XV.

LOGARITHMS of the APPARENT ALTITUDES.

	APPARENT ALTITUDES.												—
M.	° 77	° 78	° 79	° 80	° 81	° 82	° 83	° 84	° 85	° 86	° 87	° 88	M.
0	0.4713	4696	4681	4666	4654	4642	4632	4624	4617	4611	4606	4603	0
1	4712	4696	4680	4666	4654	4642	4632	4624	4616	4610	4606	4603	1
2	4712	4695	4680	4666	4653	4642	4632	4624	4616	4610	4606	4603	2
3	4712	4695	4680	4666	4653	4642	4632	4623	4616	4610	4606	4603	3
4	4712	4695	4680	4666	4653	4642	4632	4623	4616	4610	4606	4602	4
5	0.4711	4695	4679	4665	4653	4642	4632	4623	4616	4610	4606	4602	5
6	4711	4694	4679	4665	4653	4641	4632	4623	4616	4610	4606	4602	6
7	4711	4694	4679	4665	4652	4641	4631	4623	4616	4610	4605	4602	7
8	4710	4694	4679	4665	4652	4641	4631	4623	4616	4610	4605	4602	8
9	4710	4694	4678	4664	4652	4641	4631	4623	4616	4610	4605	4602	9
10	0.4710	4693	4678	4664	4652	4641	4631	4623	4615	4610	4605	4602	10
11	4710	4693	4678	4664	4652	4641	4631	4622	4615	4610	4605	4602	11
12	4709	4693	4678	4664	4651	4640	4631	4622	4615	4610	4605	4602	12
13	4709	4693	4677	4664	4651	4640	4631	4622	4615	4609	4605	4602	13
14	4709	4692	4677	4663	4651	4640	4630	4622	4615	4609	4605	4602	14
15	0.4708	4692	4677	4663	4651	4640	4630	4622	4615	4609	4605	4602	15
16	4708	4692	4677	4663	4651	4640	4630	4622	4615	4609	4605	4602	16
17	4708	4691	4676	4663	4650	4640	4630	4622	4615	4609	4605	4602	17
18	4708	4691	4676	4663	4650	4639	4630	4622	4615	4609	4605	4602	18
19	4707	4691	4676	4662	4650	4639	4630	4621	4615	4609	4605	4602	19
20	0.4707	4691	4676	4662	4650	4639	4629	4621	4614	4609	4605	4602	20
21	4707	4690	4675	4662	4650	4639	4629	4621	4614	4609	4605	4602	21
22	4706	4690	4675	4662	4649	4639	4629	4621	4614	4609	4605	4602	22
23	4706	4690	4675	4661	4649	4638	4629	4621	4614	4609	4605	4602	23
24	4706	4690	4675	4661	4649	4638	4629	4621	4614	4609	4604	4602	24
25	0.4706	4689	4675	4661	4649	4638	4629	4621	4614	4608	4604	4602	25
26	4705	4689	4674	4661	4649	4638	4629	4621	4614	4608	4604	4602	26
27	4705	4689	4674	4661	4649	4638	4628	4620	4614	4608	4604	4602	27
28	4705	4689	4674	4660	4648	4638	4628	4620	4614	4608	4604	4602	28
29	4705	4688	4674	4660	4648	4637	4628	4620	4614	4608	4604	4602	29
30	0.4704	4688	4673	4660	4648	4637	4628	4620	4613	4608	4604	4601	30
31	4704	4688	4673	4660	4648	4637	4628	4620	4613	4608	4604	4601	31
32	4704	4688	4673	4660	4648	4637	4628	4620	4613	4608	4604	4601	32
33	4703	4687	4673	4659	4647	4637	4628	4620	4613	4608	4604	4601	33
34	4703	4687	4672	4659	4647	4637	4627	4620	4613	4608	4604	4601	34
35	0.4703	4687	4672	4659	4647	4636	4627	4619	4613	4608	4604	4601	35
36	4703	4687	4672	4659	4647	4636	4627	4619	4613	4608	4604	4601	36
37	4702	4686	4672	4658	4647	4636	4627	4619	4613	4698	4604	4601	37
38	4702	4686	4671	4658	4646	4636	4627	4619	4613	4607	4604	4601	38
39	4702	4686	4671	4658	4646	4636	4627	4619	4613	4607	4604	4601	39
40	0.4701	4686	4671	4658	4646	4636	4627	4619	4612	4607	4604	4601	40
41	4701	4685	4671	4658	4646	4636	4626	4619	4612	4607	4604	4601	41
42	4701	4685	4671	4657	4646	4635	4626	4619	4612	4607	4603	4601	42
43	4701	4685	4670	4657	4646	4635	4626	4618	4612	4607	4603	4601	43
44	4700	4685	4670	4657	4645	4635	4626	4618	4612	4607	4603	4601	44
45	0.4700	4684	4670	4657	4645	4635	4626	4618	4612	4607	4603	4601	45
46	4700	4684	4670	4657	4645	4635	4626	4618	4612	4607	4603	4601	46
47	4699	4684	4669	4656	4645	4635	4626	4618	4612	4607	4603	4601	47
48	4699	4684	4669	4656	4645	4634	4625	4618	4612	4607	4603	4601	48
49	4699	4683	4669	4656	4644	4634	4625	4618	4612	4607	4603	4601	49
50	0.4699	4683	4669	4656	4644	4634	4625	4618	4611	4607	4603	4601	50
51	4698	4683	4669	4656	4644	4634	4625	4618	4611	4607	4603	4601	51
52	4698	4683	4668	4655	4644	4634	4625	4617	4611	4606	4603	4601	52
53	4698	4682	4668	4655	4644	4634	4625	4617	4611	4606	4603	4601	53
54	4698	4682	4668	4655	4644	4633	4625	4617	4611	4606	4603	4601	54
55	0.4697	4682	4668	4655	4643	4633	4625	4617	4611	4606	4603	4601	55
56	4697	4682	4667	4655	4643	4633	4624	4617	4611	4606	4603	4601	56
57	4697	4681	4667	4654	4643	4633	4624	4617	4611	4606	4603	4601	57
58	4696	4681	4667	4654	4643	4633	4624	4617	4611	4606	4603	4601	58
59	4696	4681	4667	4654	4643	4633	4624	4617	4611	4606	4603	4601	59
M.	77°	78°	79°	80°	81°	82°	83°	84°	85°	86°	87°	88°	M.
	APPARENT ALTITUDES.												

TABLE XVI.

LOGARITHMS of the APPARENT DISTANCE.

	APPARENT DISTANCE.												
	18°		19°		20°		21°		22°		23°		
M.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	M.
0	0.4900	0.5118	0.5126	0.5370	0.5341	0.5611	0.5543	0.5842	0.5736	0.6064	0.5919	0.6279	0
1	4904	5122	5130	5374	5344	5615	5547	5846	5739	6068	5922	6282	1
2	4908	5126	5134	5378	5347	5619	5550	5849	5742	6071	5925	6286	2
3	4911	5131	5137	5382	5351	5622	5553	5853	5745	6075	5928	6289	3
4	4915	5135	5141	5386	5354	5626	5556	5857	5748	6079	5931	6293	4
5	0.4919	0.5139	0.5145	0.5390	0.5358	0.5630	0.5560	0.5861	0.5751	0.6082	0.5934	0.6296	5
6	4923	5143	5148	5394	5361	5634	5563	5864	5754	6086	5937	6300	6
7	4927	5148	5152	5398	5365	5638	5566	5868	5758	6090	5940	6303	7
8	4931	5152	5156	5402	5368	5642	5570	5872	5761	6093	5943	6307	8
9	4935	5156	5159	5407	5372	5646	5573	5876	5764	6097	5945	6310	9
10	0.4939	0.5161	0.5163	0.5411	0.5375	0.5650	0.5576	0.5879	0.5767	0.6100	0.5948	0.6314	10
11	4942	5165	5167	5415	5379	5654	5579	5883	5770	6104	5951	6317	11
12	4946	5169	5170	5419	5382	5658	5583	5887	5773	6108	5954	6321	12
13	4950	5173	5174	5423	5385	5662	5586	5891	5776	6111	5957	6324	13
14	4954	5178	5177	5427	5389	5665	5589	5894	5779	6115	5960	6328	14
15	0.4958	0.5182	0.5181	0.5431	0.5392	0.5669	0.5592	0.5898	0.5782	0.6118	0.5963	0.6331	15
16	4962	5186	5185	5435	5396	5673	5596	5902	5785	6122	5966	6334	16
17	4965	5190	5188	5439	5399	5677	5599	5906	5789	6126	5969	6338	17
18	4969	5195	5192	5443	5402	5681	5602	5909	5792	6129	5972	6341	18
19	4973	5199	5196	5447	5406	5685	5605	5913	5795	6133	5975	6345	19
20	0.4977	0.5203	0.5199	0.5451	0.5409	0.5689	0.5609	0.5917	0.5798	0.6136	0.5978	0.6348	20
21	4981	5207	5203	5455	5413	5693	5612	5921	5801	6140	5981	6352	21
22	4984	5212	5206	5459	5416	5696	5615	5924	5804	6144	5984	6355	22
23	4988	5216	5210	5463	5420	5700	5618	5928	5807	6147	5987	6359	23
24	4992	5220	5213	5467	5423	5704	5621	5932	5810	6151	5990	6362	24
25	0.4996	0.5224	0.5217	0.5471	0.5426	0.5708	0.5625	0.5935	0.5813	0.6154	0.5992	0.6366	25
26	5000	5228	5221	5475	5430	5712	5628	5939	5816	6158	5995	6369	26
27	5003	5233	5224	5479	5433	5716	5631	5943	5819	6162	5998	6373	27
28	5007	5237	5228	5483	5436	5720	5634	5947	5822	6165	6001	6376	28
29	5011	5241	5231	5487	5440	5724	5638	5950	5825	6169	6004	6380	29
30	0.5015	0.5245	0.5235	0.5491	0.5443	0.5727	0.5641	0.5954	0.5828	0.6172	0.6007	0.6383	30
31	5019	5249	5239	5496	5447	5731	5644	5958	5831	6176	6010	6386	31
32	5022	5254	5242	5500	5450	5735	5647	5961	5834	6179	6013	6390	32
33	5026	5258	5246	5504	5453	5739	5650	5965	5838	6183	6016	6393	33
34	5030	5262	5249	5508	5457	5743	5654	5969	5841	6187	6019	6397	34
35	0.5034	0.5266	0.5253	0.5512	0.5460	0.5747	0.5657	0.5972	0.5844	0.6190	0.6022	0.6400	35
36	5037	5270	5256	5516	5463	5750	5660	5976	5847	6194	6024	6404	36
37	5041	5275	5260	5520	5467	5754	5663	5980	5850	6197	6027	6407	37
38	5045	5279	5263	5524	5470	5758	5666	5984	5853	6201	6030	6411	38
39	5049	5283	5267	5528	5474	5762	5670	5987	5856	6204	6033	6414	39
40	0.5052	0.5287	0.5270	0.5531	0.5477	0.5766	0.5673	0.5991	0.5859	0.6208	0.6036	0.6417	40
41	5056	5292	5274	5535	5480	5770	5676	5995	5862	6211	6039	6421	41
42	5060	5295	5278	5539	5484	5773	5679	5998	5865	6215	6042	6424	42
43	5064	5299	5281	5543	5487	5777	5682	6002	5868	6219	6045	6428	43
44	5067	5304	5285	5547	5490	5781	5685	6006	5871	6222	6047	6431	44
45	0.5071	0.5308	0.5288	0.5551	0.5494	0.5785	0.5689	0.6009	0.5874	0.6226	0.6050	0.6435	45
46	5075	5312	5292	5555	5497	5789	5692	6013	5877	6229	6053	6438	46
47	5078	5316	5295	5559	5500	5792	5695	6017	5880	6233	6056	6441	47
48	5082	5320	5299	5563	5504	5796	5698	6020	5883	6236	6059	6445	48
49	5086	5324	5302	5567	5507	5800	5701	6024	5886	6240	6062	6448	49
50	0.5090	0.5329	0.5306	0.5571	0.5510	0.5804	0.5704	0.6028	0.5889	0.6243	0.6065	0.6452	50
51	5093	5333	5309	5575	5514	5808	5708	6031	5892	6247	6068	6455	51
52	5097	5337	5313	5579	5517	5811	5711	6035	5895	6250	6070	6459	52
53	5101	5341	5316	5583	5520	5815	5714	6039	5898	6254	6073	6462	53
54	5104	5345	5320	5587	5523	5819	5717	6042	5901	6257	6076	6465	54
55	0.5108	0.5349	0.5323	0.5591	0.5527	0.5823	0.5720	0.6046	0.5904	0.6261	0.6079	0.6469	55
56	5112	5353	5327	5595	5530	5827	5723	6050	5907	6264	6082	6472	56
57	5115	5357	5330	5599	5533	5830	5726	6053	5910	6268	6085	6476	57
58	5119	5362	5334	5603	5537	5834	5730	6057	5913	6271	6087	6479	58
59	5123	5366	5337	5607	5540	5838	5733	6060	5916	6275	6090	6482	59
60	5126	5370	5341	5611	5543	5842	5736	6064	5919	6279	6093	6486	60
M.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	M.
	18°		19°		20°		21°		22°		23°		
	APPARENT DISTANCE.												

TABLE XVI.

LOGARITHMS of the APPARENT DISTANCE.

APPARENT DISTANCE.

M.	24°		25°		26°		27°		28°		29°		M.
	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	
0	0.6093	0.6486	0.6259	0.6687	0.6418	0.6882	0.6570	0.7072	0.6716	0.7257	0.6856	0.7438	0
1	6096	6489	6262	6690	6121	6885	6573	7075	6718	7260	6858	7441	1
2	6099	6493	6265	6693	6424	6888	6575	7078	6721	7263	6860	7443	2
3	6102	6496	6268	6697	6426	6891	6578	7081	6723	7266	6863	7446	3
4	6104	6499	6270	6700	6429	6895	6580	7084	6726	7269	6865	7449	4
5	0.6107	0.6503	0.6273	0.6703	0.6431	0.6898	0.6583	0.7087	0.6728	0.7272	0.6867	0.7452	5
6	6110	6506	6276	6706	6434	6901	6585	7090	6730	7275	6869	7455	6
7	6113	6510	6278	6710	6437	6904	6588	7093	6733	7278	6872	7458	7
8	6116	6513	6281	6713	6439	6907	6590	7097	6735	7281	6874	7461	8
9	6119	6516	6284	6716	6442	6911	6593	7100	6737	7284	6876	7464	9
10	0.6121	0.6520	0.6286	0.6720	0.6444	0.6914	0.6595	0.7103	0.6740	0.7287	0.6878	0.7467	10
11	6124	6523	6289	6723	6447	6917	6598	7106	6742	7290	6881	7470	11
12	6127	6527	6292	6726	6449	6920	6600	7109	6744	7293	6883	7473	12
13	6130	6530	6295	6729	6452	6923	6603	7112	6747	7296	6885	7476	13
14	6133	6533	6297	6733	6455	6927	6605	7115	6749	7299	6887	7479	14
15	0.6135	0.6537	0.6300	0.6736	0.6457	0.6930	0.6607	0.7118	0.6752	0.7302	0.6890	0.7482	15
16	6138	6540	6303	6739	6460	6933	6610	7121	6754	7305	6892	7485	16
17	6141	6543	6305	6743	6462	6936	6612	7125	6756	7308	6894	7488	17
18	6144	6547	6308	6746	6465	6939	6615	7128	6759	7311	6896	7491	18
19	6147	6550	6311	6749	6467	6942	6617	7131	6761	7314	6899	7494	19
20	0.6149	0.6553	0.6313	0.6752	0.6470	0.6946	0.6620	0.7134	0.6763	0.7317	0.6901	0.7497	20
21	6152	6557	6316	6756	6472	6949	6622	7137	6766	7320	6903	7500	21
22	6155	6560	6319	6759	6475	6952	6625	7140	6768	7324	6905	7503	22
23	6158	6564	6321	6762	6477	6955	6627	7143	6770	7327	6908	7506	23
24	6161	6567	6324	6765	6480	6958	6629	7146	6773	7330	6910	7509	24
25	0.6163	0.6570	0.6327	0.6769	0.6483	0.6962	0.6632	0.7149	0.6775	0.7333	0.6912	0.7512	25
26	6166	6574	6329	6772	6485	6965	6634	7152	6777	7336	6914	7515	26
27	6169	6577	6332	6775	6488	6968	6637	7156	6780	7339	6917	7518	27
28	6172	6580	6335	6778	6490	6971	6639	7159	6782	7342	6919	7521	28
29	6175	6584	6337	6782	6493	6974	6642	7162	6784	7345	6921	7523	29
30	0.6177	0.6587	0.6340	0.6785	0.6495	0.6977	0.6644	0.7165	0.6787	0.7348	0.6923	0.7526	30
31	6180	6590	6342	6788	6498	6981	6646	7168	6789	7351	6926	7529	31
32	6183	6594	6345	6791	6500	6984	6649	7171	6791	7354	6928	7532	32
33	6186	6597	6348	6795	6503	6987	6651	7174	6794	7357	6930	7535	33
34	6188	6600	6350	6798	6505	6990	6654	7177	6796	7360	6932	7538	34
35	0.6191	0.6604	0.6353	0.6801	0.6508	0.6993	0.6656	0.7180	0.6798	0.7363	0.6935	0.7541	35
36	6194	6607	6356	6804	6510	6996	6659	7183	6801	7366	6937	7544	36
37	6197	6610	6358	6808	6513	6999	6661	7186	6803	7369	6939	7547	37
38	6199	6614	6361	6811	6515	7003	6663	7189	6805	7372	6941	7550	38
39	6202	6617	6364	6814	6518	7006	6666	7192	6808	7375	6943	7553	39
40	0.6205	0.6620	0.6366	0.6817	0.6521	0.7009	0.6668	0.7196	0.6810	0.7378	0.6946	0.7556	40
41	6208	6624	6369	6821	6523	7012	6671	7199	6812	7381	6948	7559	41
42	6210	6627	6371	6824	6526	7015	6673	7202	6814	7384	6950	7562	42
43	6213	6630	6374	6827	6528	7018	6675	7205	6817	7387	6952	7565	43
44	6216	6634	6377	6830	6531	7022	6678	7208	6819	7390	6954	7568	44
45	0.6219	0.6637	0.6379	0.6834	0.6533	0.7025	0.6680	0.7211	0.6821	0.7393	0.6957	0.7571	45
46	6221	6640	6382	6837	6536	7028	6683	7214	6824	7396	6959	7573	46
47	6224	6644	6385	6840	6538	7031	6685	7217	6826	7399	6961	7576	47
48	6227	6647	6387	6843	6541	7034	6687	7220	6828	7402	6963	7579	48
49	6230	6650	6390	6846	6543	7037	6690	7223	6831	7405	6966	7582	49
50	0.6232	0.6654	0.6392	0.6850	0.6546	0.7040	0.6692	0.7226	0.6833	0.7408	0.6968	0.7585	50
51	6235	6657	6395	6853	6548	7043	6695	7229	6835	7411	6970	7588	51
52	6238	6660	6398	6856	6551	7047	6697	7232	6837	7414	6972	7591	52
53	6240	6664	6400	6859	6553	7050	6699	7235	6840	7417	6974	7594	53
54	6243	6667	6403	6863	6556	7053	6702	7238	6842	7420	6977	7597	54
55	0.6246	0.6670	0.6405	0.6866	0.6558	0.7056	0.6704	0.7241	0.6844	0.7423	0.6979	0.7600	55
56	6219	6674	6408	6869	6561	7059	6707	7245	6847	7426	6981	7603	56
57	6251	6677	6411	6872	6563	7062	6709	7248	6849	7429	6983	7606	57
58	6254	6680	6413	6875	6566	7065	6711	7251	6851	7432	6985	7609	58
59	6257	6683	6416	6879	6568	7069	6714	7254	6853	7435	6988	7611	59
60	6259	6687	6418	6882	6570	7072	6716	7257	6856	7438	6990	7614	60
M.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T	Log. S.	Log. T.	M.
	24°		25°		26°		27°		28°		29°		

APPARENT DISTANCE.

TABLE XVI.

LOGARITHMS of the APPARENT DISTANCE.

APPARENT DISTANCE.

M.	30°		31°		32°		33°		34°		35°		M.
	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	
0	0.6990	0.7614	0.7118	0.7788	0.7242	0.7958	0.7361	0.8125	0.7476	0.8290	0.7586	0.8452	0
1	6992	7617	7121	7791	7244	7961	7363	8128	7477	8293	7588	8455	1
2	6994	7620	7123	7793	7246	7964	7365	8131	7479	8295	7590	8458	2
3	6996	7623	7125	7796	7248	7966	7367	8133	7481	8298	7591	8460	3
4	6998	7626	7127	7799	7250	7969	7369	8136	7483	8301	7593	8463	4
5	0.7001	0.7629	0.7129	0.7802	0.7252	0.7972	0.7371	0.8139	0.7485	0.8303	0.7595	0.8466	5
6	7003	7632	7131	7805	7254	7975	7373	8142	7487	8306	7597	8468	6
7	7005	7635	7133	7808	7256	7978	7375	8145	7489	8309	7599	8471	7
8	7007	7638	7135	7811	7258	7980	7377	8147	7491	8312	7600	8474	8
9	7009	7641	7137	7813	7260	7983	7379	8150	7492	8314	7602	8476	9
10	0.7012	0.7644	0.7139	0.7816	0.7262	0.7986	0.7380	0.8153	0.7494	0.8317	0.7604	0.8479	10
11	7014	7646	7141	7819	7264	7989	7382	8156	7496	8320	7606	8482	11
12	7016	7649	7144	7822	7266	7992	7384	8158	7498	8323	7607	8484	12
13	7018	7652	7146	7825	7268	7994	7386	8161	7500	8325	7609	8487	13
14	7020	7655	7148	7828	7270	7997	7388	8164	7502	8328	7611	8490	14
15	0.7022	0.7658	0.7150	0.7831	0.7272	0.8000	0.7390	0.8167	0.7504	0.8331	0.7613	0.8493	15
16	7025	7661	7152	7833	7274	8003	7392	8169	7505	8333	7615	8495	16
17	7027	7664	7154	7836	7276	8006	7394	8172	7507	8336	7616	8498	17
18	7029	7667	7156	7839	7278	8008	7396	8175	7509	8339	7618	8501	18
19	7031	7670	7158	7842	7280	8011	7398	8178	7511	8342	7620	8503	19
20	0.7033	0.7673	0.7160	0.7845	0.7282	0.8014	0.7400	0.8180	0.7513	0.8344	0.7622	0.8506	20
21	7035	7675	7162	7848	7284	8017	7402	8183	7515	8347	7624	8509	21
22	7037	7678	7164	7850	7286	8020	7404	8186	7517	8350	7625	8511	22
23	7040	7681	7166	7853	7288	8022	7406	8189	7518	8352	7627	8514	23
24	7042	7684	7168	7856	7290	8025	7407	8191	7520	8355	7629	8517	24
25	0.7044	0.7687	0.7171	0.7859	0.7292	0.8028	0.7409	0.8194	0.7522	0.8358	0.7631	0.8519	25
26	7046	7690	7173	7862	7294	8031	7411	8197	7524	8361	7632	8522	26
27	7048	7693	7175	7865	7296	8034	7413	8200	7526	8363	7634	8525	27
28	7050	7698	7177	7868	7298	8036	7415	8202	7528	8366	7636	8527	28
29	7053	7699	7179	7870	7300	8039	7417	8205	7529	8369	7638	8530	29
30	0.7055	0.7701	0.7181	0.7873	0.7302	0.8042	0.7419	0.8208	0.7531	0.8371	0.7640	0.8532	30
31	7057	7704	7183	7876	7308	8045	7421	8211	7533	8374	7641	8535	31
32	7059	7707	7185	7879	7306	8047	7423	8213	7535	8377	7643	8538	32
33	7061	7710	7187	7882	7308	8050	7425	8216	7537	8379	7645	8541	33
34	7063	7713	7189	7885	7310	8053	7427	8219	7539	8382	7647	8543	34
35	0.7065	0.7716	0..7191	0.7887	0.7312	0.8056	0.7428	0.8222	0.7540	0.8385	0.7648	0.8546	35
36	7068	7719	7193	7890	7314	8059	7430	8224	7542	8388	7650	8549	36
37	7070	7722	7195	7893	7316	8061	7432	8227	7544	8390	7652	8551	37
38	7072	7725	7197	7896	7318	8064	7434	8230	7546	8393	7654	8554	38
39	7074	7727	7199	7899	7320	8067	7436	8233	7548	8396	7655	8557	39
40	0.7076	0.7730	0.7201	0.7902	0.7322	0.8070	0.7438	0.8235	0.7550	0.8398	0.7657	0.8559	40
41	7078	7733	7203	7904	7324	8072	7440	8238	7551	8401	7659	8562	41
42	7080	7736	7205	7907	7326	8075	7442	8241	7553	8404	7661	8565	42
43	7082	7739	7208	7910	7328	8078	7444	8243	7555	8406	7662	8567	43
44	7085	7742	7210	7913	7330	8081	7446	8246	7557	8409	7664	8570	44
45	0.7087	0.7745	0.7212	0.7916	0.7332	0.8084	0.7447	0.8249	0.7559	0.8412	0.7666	0.8573	45
46	7089	7748	7214	7918	7334	8086	7449	8252	7561	8415	7668	8575	46
47	7091	7750	7216	7921	7336	8089	7451	8254	7562	8417	7669	8578	47
48	7093	7753	7218	7924	7338	8092	7453	8257	7564	8420	7671	8581	48
49	7095	7756	7220	7927	7340	8095	7455	8260	7566	8423	7673	8583	49
50	0.7097	0.7759	0.7222	0.7930	0.7342	0.8097	0.7457	0.8263	0.7568	0.8425	0.7675	0.8586	50
51	7099	7762	7224	7933	7344	8100	7459	8265	7570	8428	7676	8589	51
52	7102	7765	7226	7935	7345	8103	7461	8268	7571	8431	7678	8591	52
53	7104	7768	7228	7938	7347	8106	7462	8271	7573	8433	7680	8594	53
54	7106	7771	7230	7941	7349	8109	7464	8274	7575	8436	7682	8597	54
55	0.7108	0.7773	0.7232	0.7944	0.7351	0.8111	0.7466	0.8276	0.7577	0.8439	0.7683	0.8599	55
56	7110	7776	7234	7947	7353	8114	7468	8279	7579	8442	7685	8602	56
57	7112	7779	7236	7949	7355	8117	7470	8282	7581	8444	7687	8605	57
58	7114	7782	7238	7952	7357	8120	7472	8284	7582	8447	7689	8607	58
59	7116	7785	7240	7955	7359	8122	7474	8287	7584	8450	7690	8610	59
60	7118	7788	7242	7958	7361	8125	7476	8290	7586	8452	7692	8613	60
M.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	M.
	30°		31°		32°		33°		34°		35°		

APPARENT DISTANCE.

TABLE XVI.

LOGARITHMS of the APPARENT DISTANCE.

APPARENT DISTANCE.

M.	36°		37°		38°		39°		40°		41°		M.
	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	
0	0.7692	0.8613	0.7795	0.8771	0.7893	0.8928	0.7989	0.9084	0.8081	0.9238	0.8169	0.9392	0
1	7694	8615	7796	8774	7895	8931	7990	9086	8082	9241	8171	9394	1
2	7696	8618	7798	8776	7897	8933	7992	9089	8084	9243	8172	9397	2
3	7697	8621	7800	8779	7898	8936	7993	9091	8085	9246	8174	9399	3
4	7699	8623	7801	8782	7900	8939	7995	9094	8087	9248	8175	9402	4
5	0.7701	0.8626	0.7803	0.8784	0.7901	0.8941	0.7997	0.9097	0.8088	0.9251	0.8177	0.9404	5
6	7703	8629	7805	8787	7903	8944	7998	9099	8090	9254	8178	9407	6
7	7704	8631	7806	8790	7905	8946	8000	9102	8091	9256	8180	9409	7
8	7706	8634	7808	8792	7906	8949	8001	9104	8093	9259	8181	9412	8
9	7708	8637	7810	8795	7908	8952	8003	9107	8094	9261	8182	9415	9
10	0.7710	0.8639	0.7811	0.8797	0.7910	0.8954	0.8004	0.9110	0.8096	0.9264	0.8184	0.9417	10
11	7711	8642	7813	8800	7911	8957	8006	9112	8097	9266	8185	9420	11
12	7713	8644	7815	8803	7913	8959	8007	9115	8099	9269	8187	9422	12
13	7715	8647	7816	8805	7914	8962	8009	9117	8100	9271	8188	9425	13
14	7716	8650	7818	8808	7916	8965	8010	9120	8102	9274	8190	9427	14
15	0.7718	0.8652	0.7820	0.8811	0.7918	0.8967	0.8012	0.9122	0.8103	0.9277	0.8191	0.9430	15
16	7720	8655	7821	8813	7919	8970	8014	9125	8105	9279	8193	9432	16
17	7722	8658	7823	8816	7921	8972	8015	9128	8106	9282	8194	9435	17
18	7723	8660	7825	8818	7922	8975	8017	9130	8108	9284	8195	9438	18
19	7725	8663	7826	8821	7924	8978	8018	9133	8109	9287	8197	9440	19
20	0.7727	0.8666	0.7828	0.8824	0.7926	0.8980	0.8020	0.9135	0.8111	0.9289	0.8198	0.9443	20
21	7728	8668	7830	8826	7927	8983	8021	9138	8112	9292	8200	9445	21
22	7730	8671	7831	8829	7929	8985	8023	9140	8114	9295	8201	9448	22
23	7732	8674	7833	8831	7930	8988	8024	9143	8115	9207	8203	9450	23
24	7734	8676	7835	8834	7932	8990	8026	9146	8117	9300	8204	9453	24
25	0.7735	0.8679	0.7836	0.8837	0.7934	0.8993	0.8027	0.9148	0.8118	0.9302	0.8206	0.9455	25
26	7737	8682	7838	8839	7935	8996	8029	9151	8120	9305	8207	9458	26
27	7739	8684	7840	8842	7937	8998	8031	9153	8121	9307	8208	9460	27
28	7740	8687	7841	8845	7938	9001	8032	9156	8122	9310	8210	9463	28
29	7742	8689	7843	8847	7940	9003	8034	9158	8124	9312	8211	9466	29
30	0.7744	0.8692	0.7844	0.8850	0.7942	0.9006	9.8035	0.9161	0.8125	0.9315	0.8213	0.9468	30
31	7746	8695	7846	8852	7943	9009	8037	9164	8127	9318	8214	9471	31
32	7747	8697	7848	8855	7945	9011	8038	9166	8128	9320	8216	9473	32
33	7749	8700	7849	8858	7946	9014	8040	9169	8130	9323	8217	9476	33
34	7751	8703	7851	8860	7948	9016	8041	9171	8131	9325	8218	9478	34
35	0.7752	0.8705	0.7853	0.8863	0.7949	0.9019	0.8043	0.9174	0.8133	0.9328	0.8220	0.9481	35
36	7754	8708	7854	8865	7951	9022	8044	9176	8134	9330	8221	9483	36
37	7756	8711	7856	8868	7953	9024	8046	9179	8136	9333	8223	9486	37
38	7758	8713	7858	8871	7954	9026	8047	9182	8137	9335	8224	9488	38
39	7759	8716	7859	8873	7956	9029	8049	9184	8139	9338	8225	9491	39
40	0.7761	0.8718	0.7861	0.8876	0.7957	0.9032	0.8050	0.9187	0.8140	0.9341	0.8227	0.9494	40
41	7763	8721	7863	8879	7959	9035	8052	9189	8142	9343	8228	9496	41
42	7764	8724	7864	8881	7960	9037	8053	9192	8143	9346	8230	9499	42
43	7766	8726	7866	8884	7962	9040	8055	9194	8145	9348	8231	9501	43
44	7768	8729	7867	8886	7964	9042	8056	9197	8146	9351	8233	9504	44
45	0.7769	0.8732	0.7869	0.8889	0.7965	0.9045	0.8058	0.9200	0.8148	0.9353	0.8234	0.9506	45
46	7771	8734	7871	8892	7967	9048	8060	9202	8149	9356	8235	9509	46
47	7773	8737	7872	8894	7968	9050	8061	9205	8150	9358	8237	9511	47
48	7774	8740	7874	8897	7970	9053	8063	9207	8152	9361	8238	9514	48
49	7776	8742	7876	8899	7972	9055	8064	9210	8153	9364	8240	9516	49
50	0.7778	0.8745	0.7877	0.8902	0.7973	0.9057	0.8066	0.9212	0.8155	0.9366	0.8241	0.9519	50
51	7780	8747	7879	8905	7975	9060	8067	9215	8156	9369	8242	9522	51
52	7781	8750	7880	8907	7976	9063	8069	9218	8158	9371	8244	9524	52
53	7783	8753	7882	8910	7978	9066	8070	9220	8159	9374	8245	9527	53
54	7785	8755	7884	8912	7979	9068	8072	9223	8161	9376	8247	9529	54
55	0.7786	0.8758	0.7885	0.8915	0.7981	0.9071	0.8073	0.9225	0.8162	0.9379	0.8248	0.9532	55
56	7788	8761	7887	8918	7982	9073	8075	9228	8164	9381	8249	9534	56
57	7790	8763	7889	8920	7984	9076	8076	9230	8165	9384	8251	9537	57
58	7791	8766	7890	8923	7986	9079	8078	9233	8167	9387	8252	9539	58
59	7793	8769	7892	8925	7987	9081	8079	9236	8168	9389	8254	9542	59
60	7795	8771	7893	8928	7989	9084	8081	9238	8169	9392	8255	9544	60
M.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	M.
	36°		37°		38°		39°		40°		41°		

APPARENT DISTANCE.

TABLE XVI.

LOGARITHMS of the APPARENT DISTANCE.

APPARENT DISTANCE.

M.	42°		43°		44°		45°		46°		47°		M.
	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	
0	0.8255	0.9544	0.8338	0.9697	0.8418	0.9848	0.8495	1.0000	0.8569	1.0152	0.8641	1.0303	0
1	8257	9547	8339	9699	8419	9851	8496	0003	8571	0154	8642	0306	1
2	8258	9549	8341	9702	8420	9853	8497	0005	8572	0157	8644	0309	2
3	8259	9552	8342	9704	8422	9856	8499	0008	8573	0159	8645	0311	3
4	8261	9555	8343	9707	8423	9858	8500	0010	8574	0162	8646	0314	4
5	0.8262	0.9557	0.8345	0.9709	0.8424	0.9861	0.8501	1.0013	0.8575	1.0164	0.8647	1.0316	5
6	8264	9560	8346	9712	8426	9864	8502	0015	8577	0167	8648	0319	6
7	8265	9562	8347	9714	8427	9866	8504	0018	8578	0169	8650	0321	7
8	8266	9565	8349	9717	8428	9869	8505	0020	8579	0172	8651	0324	8
9	8268	9567	8350	9719	8429	9871	8506	0023	8580	0174	8652	0326	9
10	0.8269	0.9570	0.8351	0.9722	0.8431	0.9874	0.8507	1.0025	0.8582	1.0177	0.8653	1.0329	10
11	8270	9572	8353	9724	8432	9876	8509	0028	8583	0179	8654	0331	11
12	8272	9575	8354	9727	8433	9879	8510	0030	8584	0182	8655	0334	12
13	8273	9577	8355	9729	8435	9881	8511	0033	8585	0185	8657	0336	13
14	8275	9580	8357	9732	8436	9884	8512	0035	8586	0187	8658	0339	14
15	0.8276	0.9582	0.8358	0.9735	0.8437	0.9886	0.8514	1.0038	0.8588	1.0190	0.8659	1.0341	15
16	8277	9585	8359	9737	8439	9889	8515	0040	8589	0192	8660	0344	16
17	8279	9588	8361	9740	8440	9891	8516	0043	8590	0195	8661	0347	17
18	8280	9590	8362	9742	8441	9894	8517	0045	8591	0197	8662	0349	18
19	8282	9593	8363	9745	8442	9896	8519	0048	8592	0200	8663	0352	19
20	0.8283	0.9595	0.8365	0.9747	0.8444	0.9899	0.8520	1.0051	0.8594	1.0202	0.8665	1.0354	20
21	8284	9598	8366	9750	8445	9901	8521	0053	8595	0205	8666	0357	21
22	8286	9600	8367	9752	8446	9904	8522	0056	8596	0207	8667	0359	22
23	8287	9603	8369	9755	8448	9907	8524	0058	8597	0210	8668	0362	23
24	8289	9605	8370	9757	8449	9909	8525	0061	8598	0212	8669	0364	24
25	0.8290	0.9608	0.8371	0.9760	0.8450	0.9912	0.8526	1.0063	0.8600	1.0215	0.8671	1.0367	25
26	8291	9610	8373	9762	8451	9914	8527	0066	8601	0217	8672	0369	26
27	8293	9613	8374	9765	8453	9917	8529	0068	8602	0220	8673	0372	27
28	8294	9615	8375	9767	8454	9919	8530	0071	8603	0222	8674	0374	28
29	8295	9618	8377	9770	8455	9922	8531	0073	8604	0225	8675	0377	29
30	0.8297	0.9621	0.8378	0.9773	0.8457	0.9924	0.8532	1.0076	0.8606	1.0228	0.8676	1.0379	30
31	8298	9623	8379	9775	8458	9927	8534	0078	8607	0230	8677	0382	31
32	8300	9626	8381	9778	8459	9929	8535	0081	8608	0233	8679	0385	32
33	8301	9628	8382	9780	8460	9932	8536	0083	8609	0235	8680	0387	33
34	8302	9631	8383	9783	8462	9934	8537	0086	8610	0238	8681	0390	34
35	0.8304	0.9633	0.8385	0.9785	0.8463	0.9937	0.8539	1.0088	0.8612	1.0240	0.8682	1.0392	35
36	8305	9636	8386	9788	8464	9939	8540	0091	8613	0243	8683	0395	36
37	8306	9638	8387	9790	8466	9942	8541	0093	8614	0245	8684	0397	37
38	8308	9641	8389	9793	8467	9944	8542	0096	8615	0248	8686	0400	38
39	8309	9643	8390	9795	8468	9947	8544	0099	8616	0250	8687	0402	39
40	0.8311	0.9646	0.8391	0.9798	0.8469	0.9949	0.8545	1.0101	0.8618	1.0253	0.8688	1.0405	40
41	8312	9648	8393	9800	8471	9952	8546	0104	8619	0255	8689	0407	41
42	8313	9651	8394	9803	8472	9955	8547	0106	8620	0258	8690	0410	42
43	8315	9653	8395	9805	8473	9957	8549	0109	8621	0260	8691	0412	43
44	8316	9656	8397	9808	8475	9960	8550	0111	8622	0263	8692	0415	44
45	0.8317	0.9659	0.8398	0.9810	0.8476	0.9962	0.8551	1.0114	0.8624	1.0265	0.8694	1.0418	45
46	8319	9661	8399	9813	8477	9965	8552	0116	8625	0268	8695	0420	46
47	8320	9664	8401	9816	8478	9967	8553	0119	8626	0271	8696	0423	47
48	8322	9666	8402	9818	8480	9970	8555	0121	8627	0273	8697	0425	48
49	8323	9669	8403	9821	8481	9972	8556	0124	8628	0276	8698	0428	49
50	0.8324	0.9671	0.8405	0.9823	0.8482	0.9975	0.8557	1.0126	0.8629	1.0278	0.8699	1.0430	50
51	8326	9674	8406	9826	8483	9977	8558	0129	8631	0281	8700	0433	51
52	8327	9676	8407	9828	8485	9980	8560	0131	8632	0283	8702	0435	52
53	8328	9679	8409	9831	8486	9982	8561	0134	8633	0286	8703	0438	53
54	8330	9681	8410	9833	8487	9985	8562	0136	8634	0288	8704	0440	54
55	0.8331	0.9684	0.8411	0.9836	0.8489	0.9987	0.8563	1.0139	0.8635	1.0291	0.8705	1.0443	55
56	8332	9686	8412	9838	8490	9990	8564	0142	8637	0293	8706	0445	56
57	8334	9689	8414	9841	8491	9992	8566	0144	8638	0296	8707	0448	57
58	8335	9691	8415	9843	8492	9995	8567	0147	8639	0298	8708	0451	58
59	8336	9694	8416	9846	8494	9997	8568	0149	8640	0301	8710	0453	59
60	8338	9697	8418	9848	8495	1.0000	8569	0152	8641	0303	8711	0456	60
M.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	M.
	42°		43°		44°		45°		46°		47°		

APPARENT DISTANCE.

TABLE XVI.

LOGARITHMS of the APPARENT DISTANCE.

APPARENT DISTANCE.

M.	48°		49°		50°		51°		52°		53°		M.
	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	
0	0.8711	1.0456	0.8778	1.0608	0.8843	1.0762	0.8905	1.0916	0.8965	1.1072	0.9023	1.1229	0
1	8712	0458	8779	0611	8844	0764	8906	0919	8966	1075	9024	1231	1
2	8713	0461	8780	0613	8845	0767	8907	0921	8967	1077	9025	1234	2
3	8714	0463	8781	0616	8846	0770	8908	0924	8968	1080	9026	1237	3
4	8715	0466	8782	0619	8847	0772	8909	0927	8969	1082	9027	1239	4
5	0.8716	1.0468	0.8783	1.0621	0.8848	1.0775	0.8910	1.0929	0.8970	1.1085	0.9028	1.1242	5
6	8718	0471	8784	0624	8849	0777	8911	0932	8971	1088	9029	1245	6
7	8719	0473	8785	0626	8850	0780	8912	0934	8972	1090	9030	1247	7
8	8720	0476	8787	0629	8851	0782	8913	0937	8973	1093	9031	1250	8
9	8721	0479	8788	0631	8852	0785	8914	0940	8974	1095	9032	1253	9
10	0.8722	1.0481	0.8789	1.0634	0.8853	1.0788	0.8915	1.0942	0.8975	1.1098	0.9033	1.1255	10
11	8723	0484	8790	0636	8854	0790	8916	0945	8976	1101	9034	1258	11
12	8724	0486	8791	0639	8855	0793	8917	0947	8977	1103	9035	1260	12
13	8725	0489	8792	0642	8856	0795	8918	0950	8978	1106	9036	1263	13
14	8727	0491	8793	0644	8857	0798	8919	0953	8979	1108	9037	1266	14
15	0.8728	1.0494	0.8794	1.0647	0.8858	1.0800	0.8920	1.0955	0.8980	1.1111	0.9038	1.1268	15
16	8729	0496	8795	0649	8859	0803	8921	0958	8981	1114	9039	1271	16
17	8730	0499	8796	0652	8860	0806	8922	0960	8982	1116	9040	1274	17
18	8731	0501	8797	0654	8862	0808	8923	0963	8983	1119	9041	1276	18
19	8732	0504	8799	0657	8863	0811	8924	0965	8984	1121	9041	1279	19
20	0.8733	1.0506	0.8800	1.0659	0.8864	1.0813	0.8925	1.0968	0.8985	1.1124	0.9042	1.1282	20
21	8734	0509	8801	0662	8865	0816	8926	0971	8986	1127	9043	1284	21
22	8736	0512	8802	0665	8866	0818	8927	0973	8987	1129	9044	1287	22
23	8737	0514	8803	0667	8867	0821	8928	0976	8988	1132	9045	1289	23
24	8738	0517	8804	0670	8868	0824	8929	0978	8989	1135	9046	1292	24
25	0.8739	1.0519	0.8805	1.0672	0.8869	1.0826	0.8930	1.0981	0.8990	1.1137	0.9047	1.1295	25
26	8740	0522	8806	0675	8870	0829	8931	0984	8991	1140	9048	1297	26
27	8741	0524	8807	0677	8871	0831	8932	0986	8992	1142	9049	1300	27
28	8742	0527	8808	0680	8872	0834	8933	0989	8993	1145	9050	1303	28
29	8743	0529	8809	0682	8873	0836	8934	0991	8994	1148	9051	1305	29
30	0.8745	1.0532	0.8810	1.0685	0.8874	1.0839	0.8935	1.0994	0.8995	1.1150	0.9052	1.1308	30
31	8746	0534	8812	0688	8875	0842	8936	0997	8996	1153	9053	1311	31
32	8747	0537	8813	0690	8876	0844	8937	0999	8997	1155	9054	1313	32
33	8748	0540	8814	0693	8877	0847	8938	1002	8998	1158	9055	1316	33
34	8749	0542	8815	0695	8878	0849	8939	1004	8999	1161	9056	1318	34
35	0.8750	1.0545	0.8816	1.0698	0.8879	1.0852	0.8940	1.1007	0.9000	1.1163	0.9056	1.1321	35
36	8751	0547	8817	0700	8880	0854	8941	1010	9000	1166	9057	1324	36
37	8752	0550	8818	0703	8881	0857	8942	1012	9001	1169	9958	1326	37
38	8753	0552	8819	0705	8882	0860	8943	1015	9002	1171	9059	1329	38
39	8755	0555	8820	0708	8883	0862	8944	1017	9003	1174	9060	1332	39
40	0.8756	1.0557	0.8821	1.0711	0.8884	1.0865	0.8945	1.1020	0.9004	1.1176	0.9061	1.1334	40
41	8757	0560	8822	0713	8885	0867	8946	1022	9005	1179	9062	1337	41
42	8758	0562	8823	0716	8887	0870	8947	1025	9006	1182	9063	1340	42
43	8759	0565	8824	0718	8888	0872	8948	1028	9007	1184	9064	1342	43
44	8760	0568	8825	0721	8889	0875	8949	1030	9008	1187	9065	1345	44
45	0.8761	1.0570	0.8827	1.0723	0.8890	1.0878	0.8950	1.1033	0.9009	1.1189	0.9066	1.1348	45
46	8762	0573	8828	0726	8891	0880	8951	1035	9010	1192	9067	1350	46
47	8763	0575	8829	0729	8892	0883	8952	1038	9011	1195	9068	1353	47
48	8765	0578	8830	0731	8893	0885	8953	1041	9012	1197	9069	1356	48
49	8766	0580	8831	0734	8894	0888	8954	1043	9013	1200	9069	1358	49
50	0.8767	1.0583	0.8832	1.0736	0.8895	1.0890	0.8955	1.1046	0.9014	1.1203	0.9070	1.1361	50
51	8768	0585	8833	0739	8896	0893	8956	1048	9015	1205	9071	1364	51
52	8769	0588	8834	0741	8897	0896	8957	1051	9016	1208	9072	1366	52
53	8770	0591	8835	0744	8898	0898	8958	1054	9017	1210	9073	1369	53
54	8771	0593	8836	0746	8899	0901	8959	1056	9018	1213	9074	1371	54
55	0.8772	1.0596	0.8837	1.0749	0.8900	1.0903	0.8960	1.1059	0.9019	1.1216	0.9075	1.1374	55
56	8773	0598	8838	0752	8901	0906	8961	1061	9020	1218	9076	1377	56
57	8775	0601	8839	0754	8902	0909	8962	1064	9021	1221	9077	1379	57
58	8776	0603	8840	0757	8903	0911	8963	1067	9022	1224	9078	1382	58
59	8777	0606	8841	0759	8904	0914	8964	1069	9023	1226	9079	1385	59
60	8778	0608	8843	0762	8905	0916	8965	1072	9023	1229	9080	1387	60
M.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	M.
	48°		49°		50°		51°		52°		53°		

APPARENT DISTANCE.

TABLE XVI

LOGARITHMS of the APPARENT DISTANCE.

APPARENT DISTANCE.

M.	54°		55°		56°		57°		58°		59°		
	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	
0	0.9080	1.1387	0.9134	1.1548	0.9186	1.1710	0.9236	1.1875	0.9284	1.2042	0.9331	1.2212	60
1	9080	1390	9135	1550	9187	1713	9237	1878	9285	2045	9331	2215	59
2	9081	1393	9135	1553	9187	1716	9238	1880	9286	2048	9332	2218	58
3	9082	1395	9136	1556	9188	1718	9238	1883	9287	2051	9333	2221	57
4	9083	1398	9137	1558	9189	1721	9239	1886	9287	2053	9334	2224	56
5	0.9084	1.1401	0.9138	1.1561	0.9190	1.1724	0.9240	1.1889	0.9288	1.2056	0.9334	1.2227	55
6	9085	1403	9139	1564	9191	1726	9241	1891	9289	2059	9335	2229	54
7	9086	1406	9140	1567	9192	1729	9242	1894	9290	2062	9336	2232	53
8	9087	1409	9141	1569	9193	1732	9242	1897	9291	2065	9337	2235	52
9	9088	1411	9142	1572	9193	1735	9243	1900	9291	2067	9337	2238	51
10	0.9089	1.1414	0.9142	1.1575	0.9194	1.1737	0.9244	1.1903	0.9292	1.2070	0.9338	1.2241	50
11	9090	1417	9143	1577	9195	1740	9245	1905	9293	2073	9339	2244	49
12	9091	1419	9144	1580	9196	1743	9246	1908	9294	2076	9340	2247	48
13	9091	1422	9145	1583	9197	1746	9247	1911	9294	2079	9340	2250	47
14	9092	1425	9146	1585	9198	1748	9247	1914	9295	2082	9341	2252	46
15	0.9093	1.1427	0.9147	1.1588	0.9198	1.1751	0.9248	1.1916	0.9296	1.2084	0.9342	1.2255	45
16	9094	1430	9148	1591	9199	1754	9249	1919	9297	2087	9343	2258	44
17	9095	1433	9149	1594	9200	1757	9250	1922	9298	2090	9343	2261	43
18	9096	1435	9149	1596	9201	1759	9251	1925	9298	2093	9344	2263	42
19	9097	1438	9150	1599	9202	1762	9251	1928	9299	2096	9345	2267	41
20	0.9098	1.1441	0.9151	1.1602	0.9203	1.1765	0.9252	1.1930	0.9300	1.2098	0.9346	1.2270	40
21	9099	1443	9152	1604	9204	1767	9253	1933	9301	2101	9346	2273	39
22	9100	1446	9153	1607	9204	1770	9254	1936	9301	2104	9347	2275	38
23	9101	1449	9154	1610	9205	1773	9255	1939	9302	2107	9348	2278	37
24	9101	1451	9155	1612	9206	1776	9255	1941	9303	2110	9349	2281	36
25	0.9102	1.1454	0.9156	1.1615	0.9207	1.1778	0.9256	1.1944	0.9304	1.2113	0.9349	1.2284	35
26	9103	1457	9156	1618	9208	1781	9257	1947	9305	2115	9350	2287	34
27	9104	1459	9157	1621	9209	1784	9258	1950	9305	2118	9351	2290	33
28	9105	1462	9158	1623	9209	1787	9259	1953	9306	2121	9352	2293	32
29	9106	1465	9159	1626	9210	1789	9259	1955	9307	2124	9352	2296	31
30	0.9107	1.1467	0.9160	1.1629	0.9211	1.1792	0.9260	1.1958	0.9308	1.2127	0.9353	1.2299	30
31	9108	1470	9161	1631	9212	1795	9261	1961	9308	2130	9354	2301	29
32	9109	1473	9162	1634	9213	1798	9262	1964	9309	2132	9355	2304	28
33	9110	1475	9163	1637	9214	1800	9263	1966	9310	2135	9355	2307	27
34	9110	1478	9163	1639	9214	1803	9264	1969	9311	2138	9356	2310	26
35	0.9111	1.1481	0.9164	1.1642	0.9215	1.1806	0.9264	1.1972	0.9312	1.2141	0.9357	1.2313	25
36	9112	1483	9165	1645	9216	1809	9265	1975	9312	2144	9358	2316	24
37	9113	1486	9166	1648	9217	1811	9266	1978	9313	2147	9358	2319	23
38	9114	1489	9167	1650	9218	1814	9267	1980	9314	2150	9359	2322	22
39	9115	1491	9168	1653	9219	1817	9268	1983	9315	2152	9360	2325	21
40	9.9116	1.1494	0.9169	1.1656	0.9219	1.1820	0.9268	1.1986	0.9315	1.2155	0.9361	1.2327	20
41	9117	1497	9169	1658	9220	1822	9269	1989	9316	2158	9361	2330	19
42	9118	1499	9170	1661	9221	1825	9270	1992	9317	2161	9362	2333	18
43	9119	1502	9171	1664	9222	1828	9271	1994	9318	2164	9363	2336	17
44	9119	1505	9172	1667	9223	1831	9272	1997	9318	2167	9364	2339	16
45	0.9120	1.1507	0.9173	1.1669	0.9224	1.1833	0.9272	1.2000	0.9319	1.2169	0.9364	1.2342	15
46	9121	1510	9174	1672	9224	1836	9273	2003	9320	2172	9365	2345	14
47	9122	1513	9175	1675	9225	1839	9274	2006	9321	2175	9366	2348	13
48	9123	1516	9175	1677	9226	1842	9275	2008	9322	2178	9367	2351	12
49	9124	1518	9176	1680	9227	1844	9275	2011	9322	2181	9367	2354	11
50	0.9125	1.1521	0.9177	1.1683	0.9228	1.1847	0.9276	1.2014	0.9323	1.2184	0.9368	1.2356	10
51	9126	1524	9178	1686	9229	1850	9277	2017	9324	2187	9369	2359	9
52	9127	1526	9179	1688	9229	1853	9278	2020	9325	2189	9369	2362	8
53	9127	1529	9180	1691	9230	1855	9279	2022	9325	2192	9370	2365	7
54	9128	1532	9181	1694	9231	1858	9279	2025	9326	2195	9371	2368	6
55	0.9129	1.1534	0.9181	1.1697	0.9232	1.1861	0.9280	1.2028	0.9327	1.2198	0.9372	1.2371	5
56	9130	1537	9182	1699	9233	1864	9281	2031	9328	2201	9372	2374	4
57	9131	1540	9183	1702	9233	1867	9282	2034	9328	2204	9373	2377	3
58	9132	1542	9184	1705	9234	1869	9283	2036	9329	2207	9374	2380	2
59	9133	1545	9185	1707	9235	1872	9283	2039	9330	2209	9375	2383	1
60	9134	1548	9186	1710	9236	1875	9284	2042	9331	2212	9375	2386	0
	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	M.
	125°		124°		123°		122°		121°		120°		

APPARENT DISTANCE

TABLE XVI.

Logarithms of the Apparent Distance.

	APPARENT DISTANCE.												
	60°		61°		62°		63°		64°		65°		
M.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	
0	0.9375	1.2386	0.9418	1.2562	0.9459	1.2743	0.9499	1.2928	0.9537	1.3118	0.9573	1.3313	60
1	9376	2389	9419	2565	9460	2746	9499	2931	9537	3121	9573	3317	59
2	9377	2391	9420	2568	9461	2749	9500	2935	9538	3125	9574	3320	58
3	9377	2394	9420	2571	9461	2752	9501	2938	9538	3128	9575	3323	57
4	9378	2397	9421	2574	9462	2755	9501	2941	9539	3131	9575	3326	56
5	0.9379	1.2400	0.9422	1.2577	0.9463	1.2759	0.9502	1.2944	0.9540	1.3134	0.9576	1.3330	55
6	9380	2403	9422	2580	9463	2762	9503	2947	9540	3137	9576	3333	54
7	9380	2406	9423	2583	9464	2765	9503	2950	9541	3141	9577	3336	53
8	9381	2409	9424	2586	9465	2768	9504	2953	9542	3144	9577	3340	52
9	9382	2412	9424	2589	9465	2771	9505	2957	9542	3147	9578	3343	51
10	0.9383	1.2415	0.9425	1.2592	0.9466	1.2774	0.9505	1.2960	0.9543	1.3150	0.9579	1.3346	50
11	9383	2418	9426	2595	9467	2777	9506	2963	9543	3154	9579	3350	49
12	9384	2421	9427	2598	9467	2780	9506	2966	9544	3157	9580	3353	48
13	9385	2424	9427	2601	9468	2783	9507	2969	9545	3160	9580	3356	47
14	9385	2427	9428	2604	9469	2786	9508	2972	9545	3163	9581	3360	46
15	0.9386	1.2429	0.9429	1.2607	0.9469	1.2789	0.9508	1.2975	0.9546	1.3166	0.9582	1.3363	45
16	9387	2432	9429	2610	9470	2792	9509	2978	9546	3170	9582	3366	44
17	9388	2435	9430	2613	9471	2795	9510	2982	9547	3173	9583	3370	43
18	9388	2438	9431	2616	9471	2798	9510	2985	9548	3176	9583	3373	42
19	9389	2441	9431	2619	9472	2801	9511	2988	9548	3179	9584	3376	41
20	0.9390	1.2444	0.9432	1.2622	0.9473	1.2804	0.9512	1.2991	0.9549	1.3183	0.9584	1.3380	40
21	9391	2447	9433	2625	9473	2808	9512	2994	9549	3186	9585	3383	39
22	9391	2450	9433	2628	9474	2811	9513	2997	9550	3189	9586	3386	38
23	9392	2453	9434	2631	9475	2814	9513	3001	9551	3192	9586	3390	37
24	9393	2456	9435	2634	9475	2817	9514	3004	9551	3196	9587	3393	36
25	0.9393	1.2459	0.9436	1.2637	0.9476	1.2820	0.9515	1.3007	0.9552	1.3199	0.9587	1.3396	35
26	9394	2462	9436	2640	9477	2823	9515	3010	9552	3202	9588	3400	34
27	9395	2465	9437	2643	9477	2826	9516	3013	9553	3205	9588	3403	33
28	9396	2468	9438	2646	9478	2829	9517	3016	9554	3209	9589	3406	32
29	9396	2471	9438	2649	9479	2832	9517	3019	9554	3212	9590	3410	31
30	0.9397	1.2474	0.9439	1.2652	0.9479	1.2835	0.9518	1.3023	0.9555	1.3215	0.9590	1.3413	30
31	9398	2477	9440	2655	9480	2838	9519	3026	9555	3218	9591	3416	29
32	9398	2479	9440	2658	9481	2841	9519	3029	9556	3222	9591	3420	28
33	9399	2482	9441	2661	9481	2844	9520	3032	9557	3225	9592	3423	27
34	9400	2485	9442	2664	9482	2848	9520	3035	9557	3228	9593	3426	26
35	0.9401	1.2488	0.9442	1.2667	0.9483	1.2851	0.9521	1.3038	0.9558	1.3231	0.9593	1.3430	25
36	9401	2491	9443	2670	9463	2854	9522	3042	9558	3235	9594	3433	24
37	9402	2494	9444	2673	9484	2857	9522	3045	9559	3238	9594	3436	23
38	9403	2497	9444	2676	9485	2860	9523	3048	9560	3241	9595	3440	22
39	9403	2500	9445	2680	9485	2863	9524	3051	9560	3244	9595	3443	21
40	0.9404	1.2503	0.9446	1.2683	0.9486	1.2866	0.9524	1.3054	0.9561	1.3248	0.9596	1.3447	20
41	9405	2506	9447	2686	9486	2869	9525	3058	9561	3251	9597	3450	19
42	9406	2509	9447	2689	9487	2872	9525	3061	9562	3254	9597	3453	18
43	9406	2512	9448	2692	9488	2875	9526	3064	9563	3257	9598	3457	17
44	9407	2515	9448	2695	9488	2879	9527	3067	9563	3261	9598	3460	16
45	0.9408	1.2518	0.9449	1.2698	0.9489	1.2882	0.9527	1.3070	0.9564	1.3264	0.9599	1.3463	15
46	9408	2521	9450	2701	9490	2885	9528	3073	9564	3267	9599	3467	14
47	9409	2524	9451	2704	9490	2888	9529	3077	9565	3271	9600	3470	13
48	9410	2527	9451	2707	9491	2891	9529	3080	9566	3274	9601	3473	12
49	9410	2530	9452	2710	9492	2894	9530	3083	9566	3277	9601	3477	11
50	0.9411	1.2533	0.9453	1.2713	0.9492	1.2897	0.9530	1.3086	0.9567	1.3280	0.9602	1.3480	10
51	9412	2536	9453	2716	9493	2900	9531	3089	9567	3284	9602	3484	9
52	9413	2539	9454	2719	9494	2903	9532	3093	9568	3287	9603	3487	8
53	9413	2542	9455	2722	9494	2907	9532	3096	9569	3290	9603	3490	7
54	9414	2545	9455	2725	9495	2910	9533	3099	0569	3294	9604	3494	6
55	0.9415	1.2548	0.9456	1.2728	0.9496	1.2913	0.9534	1.3102	0.9570	1.3297	0.9604	1.3497	5
56	9415	2551	9457	2731	9496	2916	9534	3105	9570	3300	9605	3501	4
57	9416	2554	9457	2734	9497	2919	9535	3109	9571	3303	9606	3504	3
58	9417	2557	9458	2737	9498	2922	9535	3112	9572	3307	9606	3507	2
59	9417	2560	9459	2740	9498	2925	9536	3115	9572	3310	9607	3511	1
60	9418	2562	9459	2743	9499	2928	9537	3118	9573	3313	9607	3514	0
	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	M.
	119°		118°		117°		116°		115°		114°		
	APPARENT DISTANCE.												

TABLE XVI.

LOGARITHMS of the APPARENT DISTANCE.

APPARENT DISTANCE.

M.	66°		67°		68°		69°		70°		71°		
	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	
0	0.9607	1.3514	0.9640	1.3721	0.9672	1.3936	0.9702	1.4158	0.9730	1.4389	0.9757	1.4630	60
1	9608	3518	9641	3725	9672	3940	9702	4162	9730	4393	9757	4634	59
2	9608	3521	9641	3729	9673	3943	9702	4166	9731	4397	9758	4638	58
3	9609	3524	9642	3732	9673	3947	9703	4170	9731	4401	9758	4643	57
4	9610	3528	9642	3736	9674	3950	9703	4173	9732	4405	9758	4647	56
5	0.9610	1.3531	0.9643	1.3739	0.9674	1.3954	0.9704	1.4177	0.9732	1.4409	0.9759	1.4651	55
6	9611	3535	9643	3743	9675	3958	9704	4181	9733	4413	9759	4655	54
7	9611	3538	9644	3746	9675	3961	9706	4185	9733	4417	9760	4659	53
8	9612	3541	9645	3750	9676	3965	9705	4189	9734	4421	9760	4663	52
9	9612	3545	9645	3753	9676	3969	9706	4192	9734	4425	9761	4667	51
10	0.9613	1.3548	0.9646	1.3757	0.9677	1.3972	0.9706	1.4196	0.9734	1.4429	0.9761	1.4671	50
11	9613	3552	9646	3760	9677	3976	9707	4200	9735	4433	9761	4676	49
12	9614	3555	9647	3764	9678	3980	9707	4204	9735	4437	9762	4680	48
13	9615	3559	9647	3767	9678	3983	9708	4208	9736	4441	9762	4684	47
14	9615	3562	9648	3771	9679	3987	9708	4211	9736	4445	9763	4688	46
15	0.9616	1.3565	0.9648	1.3774	0.9679	1.3991	0.9709	1.4215	0.9737	1.4449	0.9763	1.4692	45
16	9616	3569	9649	3778	9680	3994	9709	4219	9737	4453	9764	4696	44
17	9617	3572	9649	3781	9680	3998	9710	4223	9738	4457	9764	4700	43
18	9617	3576	9650	3785	9681	4002	9710	4227	9738	4461	9764	4705	42
19	9618	3579	9650	3789	9681	4005	9711	4230	9739	4465	9765	4709	41
20	0.9618	1.3583	0.9651	1.3792	0.9682	1.4009	0.9711	1.4234	0.9739	1.4469	0.9765	1.4713	40
21	9619	3586	9651	3796	9682	4013	9712	4238	9739	4473	9766	4717	39
22	9620	3589	9652	3799	9683	4016	9712	4242	9740	4476	9766	4721	38
23	9620	3593	9652	3803	9683	4020	9713	4246	9740	4480	9767	4725	37
24	9621	3596	9653	3806	9684	4024	9713	4250	9741	4484	9767	4730	36
25	0.9621	1.3600	0.9654	1.3810	0.9684	1.4028	0.9714	1.4253	0.9741	1.4488	0.9767	1.4734	35
26	9622	3603	9654	3813	9685	4031	9714	4257	9742	4492	9768	4738	34
27	9622	3607	9655	3817	9685	4035	9714	4261	9742	4496	9768	4742	33
28	9623	3610	9655	3821	9686	4039	9715	4265	9743	4500	9769	4746	32
29	9623	3614	9656	3824	9686	4042	9715	4269	9743	4504	9769	4751	31
30	0.9624	1.3617	0.9656	1.3828	0.9687	1.4046	0.9716	1.4273	0.9743	1.4509	0.9770	1.4755	30
31	9625	3620	9657	3831	9687	4050	9716	4276	9744	4513	9770	4759	29
32	9625	3624	9657	3835	9688	4053	9717	4280	9744	4517	9770	4763	28
33	9626	3627	9658	3838	9688	4057	9717	4284	9745	4521	9771	4767	27
34	9626	3631	9658	3842	9689	4061	9718	4238	9745	4525	9771	4772	26
35	0.9627	1.3634	0.9659	1.3846	0.9689	1.4065	0.9718	1.4292	0.9746	1.4529	0.9772	1.4776	25
36	9657	3638	9659	3849	9690	4068	9719	4296	9746	4533	9772	4780	24
37	9628	3641	9660	3853	9690	4072	9719	4300	9747	4537	9773	4784	23
38	9628	3645	9660	3856	9691	4076	9720	4304	9747	4541	9773	4788	22
39	9629	3648	9661	3860	9691	4079	9720	4307	9747	4545	9773	4793	21
40	0.9629	1.3652	0.9661	1.3864	0.9692	1.4083	0.9721	1.4311	0.9748	1.4549	0.9774	1.4797	20
41	9630	3655	9662	3867	9692	4087	9721	4315	9748	4553	9774	4801	19
42	9631	3659	9662	3871	9693	4091	9722	4319	9749	4557	9775	4805	18
43	9631	3662	9663	3874	9693	4094	9722	4323	9749	4561	9775	4810	17
44	9632	3666	9663	3878	9694	4098	9722	4327	9750	4565	9775	4814	16
45	0.9632	1.3669	0.9664	1.3882	0.9694	1.4102	0.9723	1.4331	0.9750	1.4569	0.9776	1.4818	15
46	9633	3673	9664	3885	9695	4106	9723	4335	9751	4573	9776	4822	14
47	9633	3676	9665	3889	9695	4109	9724	4338	9751	4577	9777	4827	13
48	9634	3679	9665	3892	9696	4113	9724	4342	9751	4581	9777	4831	12
49	9634	3683	9666	3896	9696	4117	9725	4346	9752	4585	9778	4835	11
50	0.9635	1.3686	0.9667	1.3900	0.9697	1.4121	0.9725	1.4350	0.9752	1.4589	0.9778	1.4839	10
51	9635	3690	9667	3903	9697	4124	9726	4354	9753	4593	9778	4844	9
52	9636	3693	9668	3907	9698	4128	9726	4358	9753	4598	9779	4848	8
53	9636	3697	9668	3910	9698	4132	9727	4362	9754	4602	9779	4852	7
54	9637	3700	9669	3914	9699	4136	9727	4366	9754	4606	9780	4857	6
55	0.9638	1.3704	0.9669	1.3918	0.9699	1.4139	0.9728	1.4370	0.9755	1.4610	0.9780	1.4861	5
56	9638	3707	9670	3921	9700	4143	9728	4374	9755	4614	9780	4865	4
57	9639	3711	9670	3925	9700	4147	9728	4378	9755	4618	9781	4869	3
58	9639	3714	9671	3929	9701	4151	9729	4381	9756	4622	9781	4874	2
59	9640	3718	9671	3932	9701	4154	9729	4385	9756	4626	9782	4878	1
60	9640	3721	9672	3936	9702	4158	9730	4389	9757	4630	9782	4882	0
	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	M.
	113°		112°		111°		110°		109°		108°		

APPARENT DISTANCE.

TABLE XVI.

LOGARITHMS of the APPARENT DISTANCE.

	APPARENT DISTANCE.												
	72°		73°		74°		75°		76°		77°		
M.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	
0	0.9782	1.4882	0.9806	1.5147	0.9828	1.5425	0.9849	1.5719	0.9869	1.6032	0.9887	1.6366	60
1	9782	4887	9806	5151	9829	5430	9850	5725	9869	6038	9888	6372	59
2	9783	4891	9807	5156	9829	5435	9850	5730	9870	6043	9888	6378	58
3	9783	4895	9807	5160	9829	5439	9850	5735	9870	6048	9888	6384	57
4	9784	4899	9807	5165	9830	5444	9851	5740	9870	6054	9888	6389	56
5	0.9784	1.4904	0.9808	1.5169	0.9830	1.5449	0.9851	1.5745	0.9871	1.6059	0.9889	1.6395	55
6	9785	4908	9808	5174	9831	5454	9851	5750	9871	6065	9889	6401	54
7	9785	4912	9809	5178	9831	5459	9852	5755	9871	6070	9889	6407	53
8	9785	4917	9809	5183	9831	5463	9852	5760	9872	6076	9890	6413	52
9	9786	4921	9809	5187	9832	5468	9852	5765	9872	6081	9890	6419	51
10	0.9786	1.4925	0.9810	1.5192	0.9832	1.5473	0.9853	1.5770	0.9872	1.6086	0.9890	1.6424	50
11	9787	4930	9810	5197	9832	5478	9853	5775	9872	6092	9890	6430	49
12	9787	4934	9811	5201	9833	5483	9853	5780	9873	6097	9891	6436	48
13	9787	4938	9811	5206	9833	5487	9854	5786	9873	6103	9891	6442	47
14	9788	4943	9811	5210	9833	5492	9854	5791	9873	6108	9891	6448	46
15	0.9788	1.4947	0.9812	1.5215	0.9834	1.5497	0.9854	1.5796	0.9874	1.6114	0.9892	1.6454	45
16	9789	4951	9812	5219	9834	5502	9855	5801	9874	6119	9892	6459	44
17	9789	4956	9812	5224	9835	5507	9855	5806	9874	6125	9892	6465	43
18	9789	4960	9813	5229	9835	5512	9855	5811	9875	6130	9892	6471	42
19	9790	4965	9813	5233	9835	5516	9856	5816	9875	6136	9893	6477	41
20	0.9790	1.4969	0.9814	1.5238	0.9836	1.5521	0.9856	1.5822	0.9875	1.6141	0.9893	1.6483	40
21	9791	4973	9814	5242	9836	5526	9856	5827	9876	6147	9893	6489	39
22	9791	4978	9814	5247	9836	5531	9857	5832	9876	6152	9894	6495	38
23	9791	4982	9815	5252	9837	5536	9857	5837	9876	6158	9894	6501	37
24	9792	4986	9815	5256	9837	5541	9857	5842	9876	6163	9894	6507	36
25	0.9792	1.4991	0.9815	1.5261	0.9837	1.5546	0.9858	1.5847	0.9877	1.6169	0.9894	1.6513	35
26	9793	4995	9816	5265	9838	5551	9858	5853	9877	6174	9895	6519	34
27	9793	5000	9816	5270	9838	5555	9858	5858	9877	6180	9895	6525	33
28	9793	5004	9817	5275	9838	5560	9859	5863	9878	6185	9895	6531	32
29	9794	5008	9817	5279	9839	5565	9859	5868	9878	6191	9896	6536	31
30	0.9794	1.5013	0.9817	1.5284	0.9839	1.5570	0.9859	1.5873	0.9878	1.6196	0.9896	1.6542	30
31	9795	5017	9818	5289	9839	5575	9860	5879	9879	6202	9896	6548	29
32	9795	5022	9818	5293	9840	5580	9860	5884	9879	6208	9896	6554	28
33	9795	5026	9818	5298	9840	5585	9860	5889	9879	6213	9897	6560	27
34	9796	5030	9819	5303	9840	5590	9861	5894	9880	6219	9897	6566	26
35	0.9796	1.5035	0.9819	1.5307	0.9841	1.5595	0.9861	1.5900	0.9880	1.6224	0.9897	1.6572	25
36	9797	5039	9820	5312	9841	5600	9861	5905	9880	6230	9897	6578	24
37	9797	5044	9820	5317	9842	5605	9862	5910	9880	6236	9898	6584	23
38	9797	5048	9820	5321	9842	5610	9862	5915	9881	6241	9898	6591	22
39	9798	5053	9821	5326	9842	5614	9862	5921	9881	6247	9898	6597	21
40	0.9798	1.5057	0.9821	1.5331	0.9843	1.5619	0.9863	1.5926	0.9881	1.6252	0.9899	1.6603	20
41	9799	5061	9821	5335	9843	5624	9863	5931	9882	6258	9899	6609	19
42	9799	5066	9822	5340	9843	5629	9863	5936	9882	6264	9899	6615	18
43	9799	5070	9822	5345	9844	5634	9864	5942	9882	6269	9899	6621	17
44	9800	5075	9823	5350	9844	5639	9864	5947	9883	6275	9900	6627	16
45	0.9800	1.5079	0.9823	1.5354	0.9844	1.5644	0.9864	1.5952	0.9883	1.6281	0.9900	1.6633	15
46	9801	5084	9823	5359	9845	5649	9865	5958	9883	6286	9900	6639	14
47	9801	5088	9824	5363	9845	5654	9865	5963	9883	6292	9901	6645	13
48	9801	5092	9824	5368	9845	5659	9865	5968	9884	6298	9901	6651	12
49	9802	5097	9824	5373	9846	5664	9866	5973	9884	6303	9901	6657	11
50	0.9802	1.5102	0.9825	1.5378	0.9846	1.5669	0.9866	1.5979	0.9884	1.6309	0.9901	1.6664	10
51	9802	5106	9825	5382	9846	5674	9866	5984	9885	6315	9902	6670	9
52	9803	5111	9826	5387	9847	5679	9867	5989	9885	6320	9902	6676	8
53	9803	5115	9826	5392	9847	5684	9867	5995	9885	6326	9902	6682	7
54	9804	5120	9826	5397	9847	5689	9867	6000	9885	6332	9902	6688	6
55	0.9804	1.5124	0.9827	1.5401	0.9848	1.5694	0.9868	1.6005	0.9886	1.6338	0.9903	1.6694	5
56	9804	5129	9827	5406	9848	5699	9868	6011	9886	6343	9903	6700	4
57	9805	5133	9827	5411	9848	5704	9868	6016	9886	6349	9903	6707	3
58	9805	5138	9828	5416	9849	5709	9868	6022	9887	6355	9904	6713	2
59	9806	5142	9828	5420	9849	5714	9869	6027	9887	6361	9904	6719	1
60	9806	5147	9828	5425	9849	5719	9869	6032	9887	6366	9904	6725	0
	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	M.
	107°		106°		105°		104°		103°		102°		
	APPARENT DISTANCE.												

TABLE XVI.

LOGARITHMS of the APPARENT DISTANCE.

	APPARENT DISTANCE.												
	78°		79°		80°		81°		82°		83°		
M.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	
0	0.9904	1.6725	0.9919	1.7113	0.9934	1.7537	0.9946	1.8003	0.9958	1.8522	0.9968	1.9109	60
1	9904	6731	9920	7120	9934	7544	9946	8011	9958	8531	9968	9119	59
2	9905	6738	9920	7127	9934	7552	9947	8019	9958	8540	9968	9129	58
3	9905	6744	9920	7134	9934	7559	9947	8027	9958	8550	9968	9140	57
4	9905	6750	9920	7141	9934	7566	9947	8036	9958	8559	9968	9151	56
5	0.9905	1.6756	0.9921	1.7147	0.9935	1.7574	0.9947	1.8044	0.9958	1.8568	0.9968	1.9161	55
6	9906	6763	9921	7154	9935	7581	9947	8052	9959	8577	9968	9172	54
7	9906	6769	9921	7161	9935	7589	9948	8060	9959	8587	9969	9182	53
8	9906	6775	9921	7168	9935	7596	9948	8069	9959	8596	9969	9193	52
9	9906	6781	9922	7175	9936	7604	9948	8077	9959	8605	9969	9204	51
10	0.9907	1.6788	0.9922	1.7181	0.9936	1.7611	0.9948	1.8085	0.9959	1.8615	0.9969	1.9214	50
11	9907	6794	9922	7188	9936	7619	9948	8094	9959	8624	9969	9225	49
12	9907	6800	9922	7195	9936	7626	9949	8102	9960	8633	9969	9236	48
13	9907	6807	9923	7202	9936	7634	9949	8110	9960	8643	9969	9246	47
14	9908	6813	9923	7209	9937	7641	9949	8119	9960	8652	9970	9257	46
15	0.9908	1.6819	0.9923	1.7216	0.9937	1.7649	0.9949	1.8127	0.9960	1.8662	0.9970	1.9268	45
16	9908	6826	9923	7223	9937	7657	9949	8136	9960	8671	9970	9279	44
17	9908	6832	9924	7230	9937	7664	9950	8144	9960	8681	9970	9290	43
18	9909	6838	9924	7236	9937	7672	9950	8152	9961	8690	9970	9301	42
19	9909	6845	9924	7243	9938	7679	9950	8161	9961	8700	9970	9312	41
20	0.9909	1.6851	0.9924	1.7250	0.9938	1.7687	0.9950	1.8170	0.9961	1.8709	0.9971	1.9322	40
21	9910	6858	9925	7257	9938	7695	9950	8178	9961	8719	9971	9333	39
22	9910	6864	9925	7264	9938	7702	9951	8186	9961	8728	9971	9344	38
23	9910	6870	9925	7271	9939	7710	9951	8195	9962	8738	9971	9355	37
24	9910	6877	9925	7278	9939	7718	9951	8203	9962	8748	9971	9367	36
25	0.9911	1.6883	0 9925	1.7285	0.9939	1.7725	0.9951	1.8212	0.9962	1.8757	0.9971	1.9378	35
26	9911	6890	9926	7292	9939	7733	9951	8221	9962	8767	9971	9389	34
27	9911	6896	9926	7299	9939	7741	9951	8229	9962	8777	9972	9400	33
28	9911	6902	9926	7306	9940	7748	9952	8238	9962	8786	9972	9411	32
29	9912	6909	9926	7313	9940	7756	9952	8246	9963	8796	9972	0422	31
30	0.9912	1.6915	0.9927	1.7320	0.9940	1.7764	0.9952	1.8255	0.9963	1.8806	0.9972	1.9433	30
31	9912	6922	9927	7327	9940	7772	9952	8264	9963	8815	9972	9445	29
32	9912	6928	9927	7334	9940	7779	9952	8272	9963	8825	9972	9456	28
33	9913	6935	9927	7342	9941	7787	9953	8281	9963	8835	9972	9467	27
34	9913	6941	9928	7349	9941	7795	9953	8290	9963	8845	9973	9479	26
35	0.9913	1.6948	0.9928	1.7356	0.9941	1.7803	0.9953	1.8298	0.9964	1.8855	0.9973	1.9490	25
36	9913	6954	9928	7363	9941	7811	9953	8307	9964	8865	9973	9501	24
37	9914	6961	9928	7370	9942	7819	9953	8316	9964	8875	9973	9513	23
38	9914	6967	9929	7377	9942	7826	9954	8325	9964	8884	9973	9524	22
39	9914	6974	9929	7384	9942	7834	9954	8333	9964	8894	9973	9536	21
40	0.9914	1.6980	0.9929	1.7391	0.9942	1.7842	0.9954	1.8342	0.9964	1.8904	0.9973	1.9547	20
41	9915	6987	9929	7399	9942	7850	9954	8351	9964	8914	9974	9559	19
42	9915	6994	9929	7406	9943	7858	9954	8360	9965	8924	9974	9570	18
43	9915	7000	9930	7413	9943	7866	9954	8369	9965	8934	9974	9582	17
44	9915	7007	9930	7420	9943	7874	9955	8378	9965	8944	9974	9593	16
45	0.9916	1.7013	0.9930	1.7427	0.9943	1.7882	0.9955	1.8387	0.9965	1.8955	0.9974	1.9605	15
46	9916	7020	9930	7435	9943	7890	9955	8395	9965	8965	9974	9617	14
47	9916	7027	9931	7442	9944	7898	9955	8404	9965	8975	9974	9629	13
48	9916	7033	9931	7449	9944	7906	9955	8413	9966	8985	9975	9640	12
49	9917	7040	9931	7456	9944	7914	9956	8422	9966	8995	9975	9652	11
50	0.9917	1.7047	0.9931	1.7464	0.9944	1.7922	0.9956	1.8431	0.9966	1.9005	0.9975	1.9664	10
51	9917	7053	9931	7471	9944	7930	9956	8440	9966	9016	9975	9676	9
52	9917	7060	9932	7478	9945	7938	9956	8449	9966	9026	9975	9688	8
53	9918	7066	9932	7485	9945	7946	9956	8458	9966	9036	9975	9700	7
54	9918	7073	9932	7493	9945	7954	9956	8467	9967	9046	9975	9711	6
55	0.9918	1.7080	0.9932	1.7500	0.9945	1.7962	0.9957	1.8476	0.9967	1.9057	0.9975	1.9723	5
56	9918	7087	9933	7507	9945	7970	9957	8485	9967	9067	9976	9735	4
57	9919	7093	9933	7515	9946	7978	9957	8495	9967	9077	9976	9747	3
58	9919	7100	9933	7522	9946	7987	9957	8504	9967	9088	9976	9760	2
59	9919	7107	9933	7529	9946	7995	9957	8513	9967	9098	9976	9772	1
60	9919	7113	9934	7537	9946	8003	9958	8522	9968	9109	9976	9784	0
	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	M.
	101°		100°		99°		98°		97°		96°		
	APPARENT DISTANCE.												

TABLE XVI.

Logarithms of the Apparent Distance.

APPARENT DISTANCE.

M.	84°		85°		86°		87°		88°		89°		
	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	
0	0.9976	1.9784	0.9983	2.0580	0.9989	2.1554	0.9994	2.2806	0.9997	2.4569	0.9999	2.7581	60
1	9976	9796	9984	0595	9989	1572	9994	2830	9997	4606	9999	7654	59
2	9976	9808	9984	0610	9990	1590	9994	2855	9997	4642	9999	7728	58
3	9977	9820	9984	0624	9990	1608	9994	2879	9997	4679	9999	7804	57
4	9977	9833	9984	0639	9990	1627	9994	2904	9998	4717	9999	7880	56
5	0.9977	1.9845	0.9984	2.0654	0.9990	2.1645	0.9994	2.2929	0.9998	2.4754	0.9999	2.7959	55
6	9977	9857	9984	0669	9990	1664	9994	2954	9998	4792	9999	8038	54
7	9977	9870	9984	0684	9990	1683	9995	2979	9998	4830	9999	8120	53
8	9977	9882	9984	0698	9990	1701	9995	3004	9998	4869	9999	8202	52
9	9977	9895	9984	0713	9990	1720	9995	3029	9998	4908	1.0000	8287	51
10	0.9977	1.9907	0.9985	2.0728	0.9990	2.1739	0.9995	2.3055	0.9998	2.4947	1.0000	2.8373	50
11	9978	9920	9985	0744	9990	1758	9995	3081	9998	4987	0000	8460	49
12	9978	9932	9985	0759	9990	1777	9995	3106	9998	5027	0000	8550	48
13	9978	9945	9985	0774	9991	1796	9995	3132	9998	5067	0000	8641	47
14	9978	9957	9985	0789	9991	1815	9995	3158	9998	5108	0000	8735	46
15	0.9978	1.9970	0.9985	2.0804	0.9991	2.1835	0.9995	2.3185	0.9998	2.5149	1.0000	2.8830	45
16	9978	9983	9985	0820	9991	1854	9995	3211	9998	5191	0000	8928	44
17	9978	9995	9985	0835	9991	1874	9995	3238	9998	5233	0000	9028	43
18	9978	2.0008	9985	0850	9991	1893	9995	3264	9998	5275	0000	9130	42
19	9979	0021	9985	0866	9991	1913	9995	3291	9998	5318	0000	9235	41
20	0.9979	2.0034	0.9986	2.0882	0.9991	2.1933	0.9995	2.3318	0.9998	2.5362	1.0000	2.9342	40
21	9979	0047	9986	0897	9991	1952	9995	3346	9998	5405	0000	9452	39
22	9979	0060	9986	0913	9991	1972	9995	3373	9998	5449	0000	9565	38
23	9979	0073	9986	0929	9991	1992	9995	3401	9998	5494	0000	9681	37
24	9979	0086	9986	0944	9991	2012	9996	3429	9998	5539	0000	9799	36
25	0.9979	2.0099	0.9986	2.0960	0.9991	2.2033	0.9996	2.3456	0.9998	2.5584	1.0000	2.9922	35
26	9979	0112	9986	0976	9992	2053	9996	3485	9998	5630	0000	3.0048	34
27	9980	0125	9986	0992	9992	2073	9996	3513	9998	5677	0000	0177	33
28	9980	0138	9986	1008	9992	2094	9996	3541	9998	5724	0000	0311	32
29	9980	0151	9986	1024	9992	2114	9996	3570	9998	5771	0000	0449	31
30	0.9980	2.0164	0 9987	2.1040	0.9992	2.2135	0.9996	2.3599	0.9999	2.5819	1.0000	3.0591	30
31	9980	0178	9987	1056	9992	2156	9996	3628	9999	5868	0000	0739	29
32	9980	0191	9987	1073	9992	2177	9996	3657	9999	5917	0000	0891	28
33	9980	0204	9987	1089	9992	2198	9996	3687	9999	5967	0000	1049	27
34	9980	0218	9987	1105	9992	2219	9996	3717	9999	6017	0000	1213	26
35	0.9981	2.0231	0.9987	2.1122	0.9992	2.2240	0.9996	2.3746	0.9999	2.6068	1.0000	3.1383	25
36	9981	0244	9987	1138	9992	2261	9996	3777	9999	6119	0000	1561	24
37	9981	0258	9987	1155	9992	2283	9996	3807	9999	6171	0000	1745	23
38	9981	0271	9987	1171	9992	2304	9996	3837	9999	6224	0000	1938	22
39	9981	0285	9987	1188	9993	2326	9996	3868	9999	6277	0000	2140	21
40	0.9981	2.0299	0.9988	2.1205	0.9993	2.2348	0.9996	2.3899	0.9999	2.6331	1.0000	3.2352	20
41	9981	0312	9988	1222	9993	2369	9996	3930	9999	6386	0000	2575	19
42	9981	0326	9988	1238	9993	2391	9996	3962	9999	6441	0000	2810	18
43	9982	0340	9988	1255	9993	2413	9997	3993	9999	6497	0000	3958	17
44	9982	0354	9988	1272	9993	2435	9997	4025	9999	6554	0000	3322	16
45	0.9982	2.0367	0 9988	2.1289	0.9993	2.2458	0.9997	2.4057	0.9999	2.6611	1.0000	3.3602	15
46	9982	0381	9988	1306	9993	2480	9997	4089	9999	6670	0000	3901	14
47	9982	0395	9988	1324	9993	2502	9997	4122	9999	6729	0000	4223	13
48	9982	0409	9988	1341	9993	2525	9997	4155	9999	6789	0000	4571	12
49	9982	0423	9988	1358	9993	2548	9997	4188	9999	6850	0000	4949	11
50	0.9982	2.0437	0.9989	2.1376	0.9993	2.2571	0.9997	2.4221	0.9999	2.6911	1.0000	3.5363	10
51	9982	0451	9989	1393	9993	2594	9997	4255	9999	6974	0000	5826	9
52	9983	0466	9989	1411	9993	2617	9997	4289	9999	7037	0000	6332	8
53	9983	0480	9989	1428	9994	2640	9997	4323	9999	7101	0000	6912	7
54	9983	0494	9989	1446	9994	2663	9997	4357	9999	7167	0000	7581	6
55	0.9983	2.0508	0.9989	2.1464	0.9994	2.2687	0.9997	2.4392	0.9999	2.7233	1.0000	3.8373	5
56	9983	0523	9989	1482	9994	2710	9997	4127	9999	7304	0000	9342	4
57	9983	0537	9989	1499	9994	2734	9997	4462	9999	7369	0000	4.0592	3
58	9983	0552	9989	1517	9994	2758	9997	4497	9999	7438	0000	2352	2
59	9983	0566	9989	1535	9994	2782	9997	4533	9999	7509	0000	5363	1
60	9983	0580	9989	1554	9994	2806	9997	4569	9999	7581	0000		
	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	Log. S.	Log. T.	M.
	95°		94°		93°		92°		91°		90°		

APPARENT DISTANCE.

TABLE XVII.

LOGARITHMS of the FIRST and SECOND CORRECTION.

The First Correction is *always* to be taken from the Top, and also the Second, when the Apparent Distance is *greater* than 90°.

	2 DEGREES.												
S.	0′	1′	2′	3′	4′	5′	6′	7′	8′	9′	10′	11′	
0	1.0000	1.0024	1.0049	1.0073	1.0098	1.0122	1.0147	1.0172	1.0197	1.0223	1.0248	1.0274	60
1	0000	0025	0049	0073	0098	0123	0148	0173	0198	0223	0249	0274	59
2	0001	0025	0049	0074	0098	0123	0148	0173	0198	0224	0249	0275	58
3	0001	0025	0050	0074	0099	0124	0148	0174	0199	0224	0250	0275	57
4	0002	0026	0050	0075	0099	0124	0149	0174	0199	0224	0250	0276	56
5	1.0002	1.0026	1.0051	1.0075	1.0100	1.0124	1.0149	1.0174	1.0200	1.0225	1.0250	1.0276	55
6	0002	0027	0051	0075	0100	0125	0150	0175	0200	0225	0251	0276	54
7	0003	0027	0051	0076	0100	0125	0150	0175	0200	0226	0251	0277	53
8	0003	0027	0052	0076	0101	0126	0151	0176	0201	0226	0252	0277	52
9	0004	0028	0052	0077	0101	0126	0151	0176	0201	0227	0252	0278	51
10	1.0004	1.0028	1.0053	1.0077	1.0102	1.0126	1.0151	1.0176	1.0202	1.0227	1.0252	1.0278	50
11	0004	0029	0053	0077	0102	0127	0152	0177	0202	0227	0253	0279	49
12	0005	0029	0053	0078	0103	0127	0152	0177	0202	0228	0253	0279	48
13	0005	0029	0054	0078	0103	0128	0153	0178	0203	0228	0253	0279	47
14	0006	0030	0054	0079	0103	0128	0153	0178	0203	0229	0254	0280	46
15	1.0006	1.0030	1.0055	1.0079	1.0104	1.0129	1.0153	1.0179	1.0204	1.0229	1.0255	1.0280	45
16	0006	0031	0055	0080	0104	0129	0154	0179	0204	0230	0255	0281	44
17	0007	0031	0055	0080	0105	0129	0154	0179	0205	0230	0255	0281	43
18	0007	0031	0056	0080	0105	0130	0155	0180	0205	0230	0256	0282	42
19	0008	0032	0056	0081	0105	0130	0155	0180	0205	0231	0256	0282	41
20	1.0008	1.0032	1.0057	1.0081	1.0106	1.0131	1.0156	1.0181	1.0206	1.0231	1.0257	1.0282	40
21	0008	0033	0057	0082	0106	0131	0156	0181	0207	0232	0257	0283	39
22	0009	0033	0057	0082	0107	0131	0156	0181	0207	0232	0258	0283	38
23	0009	0034	0058	0082	0107	0132	0157	0182	0207	0233	0258	0284	37
24	0010	0034	0058	0083	0107	0132	0157	0182	0208	0233	0258	0284	36
25	1.0010	1.0034	1.0059	1.0083	1.0108	1.0133	1.0158	1.0183	1.0208	1.0233	1.0259	1.0285	35
26	0010	0035	0059	0084	0108	0133	0158	0183	0208	0234	0259	0285	34
27	0011	0035	0060	0084	0109	0134	0158	0184	0209	0234	0259	0285	33
28	0011	0036	0060	0084	0109	0134	0159	0184	0209	0235	0260	0286	32
29	0012	0036	0060	0085	0110	0134	0159	0184	0210	0235	0260	0286	31
30	1.0012	1.0036	1.0061	1.0085	1.0110	1.0135	1.0160	1.0185	1.0210	1.0235	1.0261	1.0287	30
31	0012	0037	0061	0086	0110	0135	0160	0185	0211	0236	0261	0287	29
32	0013	0037	0062	0086	0111	0136	0161	0186	0211	0236	0261	0288	28
33	0013	0038	0062	0087	0111	0136	0161	0186	0211	0237	0262	0288	27
34	0014	0038	0062	0087	0112	0136	0161	0187	0212	0237	0262	0288	26
35	1.0014	1.0038	1.0063	1.0087	1.0112	1.0137	1.0162	1.0187	1.0212	1.0238	1.0263	1.0289	25
36	0015	0039	0063	0088	0112	0137	0162	0187	0213	0238	0263	0289	24
37	0015	0039	0064	0088	0113	0138	0163	0188	0213	0238	0264	0290	23
38	0015	0040	0064	0089	0113	0138	0163	0188	0213	0239	0264	0290	22
39	0016	0040	0064	0089	0114	0139	0163	0189	0214	0239	0264	0291	21
40	1.0016	1.0040	1.0065	1.0089	1.0114	1.0139	1.0164	1.0189	1.0214	1.0240	1.0265	1.0291	20
41	0017	0941	0065	0090	0114	0139	0164	0189	0215	0240	0266	0291	19
42	0017	0041	0066	0090	0115	0140	0165	0190	0215	0241	0266	0292	18
43	0017	0042	0066	0091	0115	0140	0165	0190	0216	0241	0267	0292	17
44	0018	0042	0066	0091	0116	0141	0166	0191	0216	0241	0267	0293	16
45	1.0018	1.0042	1.0067	1.0091	1.0116	1.0141	1.0166	1.0191	1.0216	1.0242	1.0267	1.0293	15
46	0019	0043	0067	0092	0117	0141	0166	0192	0217	0242	0268	0294	14
47	0019	0043	0068	0092	0117	0142	0167	0192	0217	0243	0268	0294	13
48	0019	0044	0068	0093	0117	0142	0167	0192	0218	0243	0269	0294	12
49	0020	0044	0068	0093	0118	0143	0168	0193	0218	0244	0269	0295	11
50	1.0020	1.0044	1.0069	1.0093	1.0118	1.0143	1.0168	1.0193	1.0219	1.0244	1.0270	1.0295	10
51	0021	0045	0069	0094	0119	0143	0169	0194	0219	0244	0270	0296	9
52	0021	0045	0070	0094	0119	0144	0169	0194	0219	0245	0270	0296	8
53	0021	0046	0070	0095	0119	0144	0169	0194	0220	0245	0271	0297	7
54	0022	0046	0071	0095	0120	0145	0170	0195	0220	0246	0271	0297	6
55	1.0022	1.0046	1.0071	1.0096	1.0120	1.0145	1.0170	1.0195	1.0221	1.0246	1.0272	1.0297	5
56	0023	0047	0071	0096	0121	0146	0171	0196	0221	0247	0272	0298	4
57	0023	0047	0072	0096	0121	0146	0171	0196	0221	0247	0273	0298	3
58	0023	0048	0072	0097	0122	0146	0171	0197	0222	0247	0273	0299	2
59	0024	0048	0073	0097	0122	0147	0172	0197	0222	0248	0273	0299	1
60	0024	0049	0073	0098	0122	0147	0172	0197	0223	0248	0274	0300	0
	59′	58′	57′	56′	55′	54′	53′	52′	51′	50′	49′	48′	S.
	7 DEGREES.												

When the Apparent Distance is *less* than 90°, the Second Correction is to be taken from the Bottom.

TABLE XVII

LOGARITHMS of the FIRST and SECOND CORRECTIONS.

The First Correction is *always* to be taken from the Top, and also the Second, when the Apparent Distance is *greater* than 90°.

	2 DEGREES.												
S.	12′	13′	14′	15′	16′	17′	18′	19′	20′	21′	22′	23′	
0	1.0300	1.0326	1.0352	1.0378	1.0405	1.0431	1.0458	1.0484	1.0512	1.0539	1.0566	1.0594	60
1	0300	0326	0352	0378	0405	0432	0458	0485	0512	0539	0567	0594	59
2	0300	0326	0353	0379	0406	0432	0459	0485	0512	0540	0567	0595	58
3	0301	0327	0353	0379	0406	0433	0459	0486	0513	0540	0568	0595	57
4	0301	0327	0353	0380	0406	0433	0460	0486	0513	0541	0568	0596	56
5	1.0302	1.0328	1.0354	1.0380	1.0407	1.0434	1.0460	1.0487	1.0514	1.0541	1.0568	1.0596	55
6	0302	0328	0354	0381	0407	0434	0461	0487	0514	0541	0569	0596	54
7	0303	0329	0355	0381	0408	0434	0461	0488	0515	0542	0569	0597	53
8	0303	0329	0355	0381	0408	0435	0462	0488	0515	0542	0570	0597	52
9	0304	0329	0356	0382	0409	0435	0462	0489	0516	0543	0570	0598	51
10	1.0304	1.0330	1.0356	1.0382	1.0409	1.0436	1.0462	1.0489	1.0516	1.0543	1.0571	1.0598	50
11	0304	0330	0356	0383	0409	0436	0463	0489	0517	0544	0571	0599	49
12	0305	0331	0357	0383	0410	0437	0463	0490	0517	0544	0572	0599	48
13	0305	0331	0358	0384	0410	0437	0464	0490	0517	0545	0572	0600	47
14	0306	0332	0358	0384	0410	0438	0464	0491	0518	0545	0573	0600	46
15	1.0306	1.0332	1.0359	1.0384	1.0411	1.0438	1.0465	1.0491	1.0518	1.0546	1.0573	1.0601	45
16	0307	0333	0359	0385	0411	0438	0465	0492	0519	0546	0573	0601	44
17	0307	0333	0360	0385	0412	0439	0466	0492	0519	0546	0574	0602	43
18	0307	0333	0360	0386	0412	0439	0466	0493	0520	0547	0574	0602	42
19	0308	0334	0361	0386	0413	0440	0466	0493	0520	0547	0575	0602	41
20	1.0308	1.0334	1.0361	1.0387	1.0413	1.0440	1.0467	1.0493	1.0521	1.0548	1.0575	1.0603	40
21	0309	0335	0361	0387	0414	0440	0467	0494	0521	0548	0576	0603	39
22	0309	0335	0362	0388	0414	0441	0468	0494	0521	0549	0576	0604	38
23	0310	0336	0362	0388	0414	0441	0468	0495	0522	0549	0577	0604	37
24	0310	0336	0362	0388	0415	0442	0469	0495	0522	0550	0577	0605	36
25	1.0310	1.0336	1.0363	1.0389	1.0415	1.0442	1.0469	1.0496	1.0523	1.0550	1.0578	1.0605	35
26	0311	0337	0363	0389	0416	0442	0470	0496	0523	0551	0578	0606	34
27	0311	0337	0363	0390	0416	0443	0470	0497	0524	0551	0579	0606	33
28	0312	0338	0364	0390	0417	0443	0470	0497	0524	0552	0579	0607	32
29	0312	0338	0364	0391	0417	0444	0471	0498	0525	0552	0579	0607	31
30	1.0313	1.0339	1.0365	1.0391	1.0418	1.0444	1.0471	1.0498	1.0525	1.0552	1.0580	1.0608	30
31	0313	0339	0365	0392	0418	0445	0471	0498	0526	0553	0580	0608	29
32	0313	0339	0366	0392	0418	0445	0472	0499	0526	0553	0581	0609	28
33	0314	0340	0366	0392	0419	0446	0472	0499	0526	0554	0581	0609	27
34	0314	0340	0366	0393	0419	0446	0472	0500	0527	0554	0582	0609	26
35	1.0315	1.0341	1.0367	1.0393	1.0420	1.0446	1.0473	1.0500	1.0527	1.0555	1.0582	1.0610	25
36	0315	0341	0367	0394	0420	0447	0474	0501	0528	0555	0583	0610	24
37	0316	0342	0368	0394	0421	0447	0474	0501	0528	0556	0583	0611	23
38	0316	0342	0368	0395	0421	0448	0475	0502	0529	0556	0584	0611	22
39	0317	0342	0369	0395	0422	0448	0475	0502	0529	0557	0584	0612	21
40	1.0317	1.0343	1.0369	1.0395	1.0422	1.0449	1.0475	1.0502	1.0530	1.0557	1.0585	1.0612	20
41	0318	0343	0370	0396	0422	0449	0476	0503	0531	0557	0585	0613	19
42	0318	0344	0370	0396	0423	0450	0476	0503	0531	0558	0585	0613	18
43	0318	0344	0370	0397	0423	0450	0477	0504	0531	0558	0586	0614	17
44	0319	0345	0371	0397	0424	0450	0477	0504	0532	0559	0586	0614	16
45	1.0319	1.0345	1.0371	1.0398	1.0424	1.0451	1.0478	1.0505	1.0532	1.0559	1.0587	1.0615	15
46	0319	0346	0372	0398	0425	0451	0478	0505	0532	0560	0587	0615	14
47	0320	0346	0372	0399	0425	0452	0479	0506	0533	0560	0588	0615	13
48	0320	0346	0373	0399	0426	0452	0479	0506	0533	0561	0588	0616	12
49	0321	0347	0373	0399	0426	0453	0480	0507	0534	0561	0589	0616	11
50	1.0321	1.0347	1.0374	1.0400	1.0426	1.0453	1.0480	1.0507	1.0534	1.0562	1.0589	1.0617	10
51	0322	0348	0374	0400	0427	0454	0480	0507	0535	0562	0590	0617	9
52	0322	0348	0374	0401	0427	0454	0481	0508	0535	0562	0590	0618	8
53	0323	0349	0375	0401	0428	0454	0481	0508	0536	0563	0591	0618	7
54	0323	0349	0375	0402	0428	0455	0482	0509	0536	0563	0591	0619	6
55	1.0323	1.0349	1.0376	1.0402	1.0429	1.0455	1.0482	1.0509	1.0536	1.0564	1.0591	1.0619	5
56	0324	0350	0376	0403	0429	0456	0483	0510	0537	0564	0592	0620	4
57	0324	0350	0377	0403	0430	0456	0483	0510	0537	0565	0592	0620	3
58	0325	0351	0377	0403	0430	0457	0484	0511	0538	0565	0593	0621	2
59	0325	0351	0377	0404	0430	0457	0484	0511	0538	0566	0593	0621	1
60	0326	0352	0378	0404	0431	0458	0484	0512	0539	0566	0594	0621	0
	47′	46′	45′	44′	43′	42′	41′	40′	39′	38′	37′	36′	S.
	7 DEGREES.												

When the Apparent Distance is *less* than 90°, the Second Correction is to be taken from the Bottom.

TABLE XVII.

LOGARITHMS of the FIRST and SECOND CORRECTIONS

The First Correction is *always* to be taken from the Top, and also the Second, when the Apparent Distance is *greater* than 90°.

	2 DEGREES.												
S.	24′	25′	26′	27′	28′	29′	30′	31′	32′	33′	34′	35′	
0	1.0621	1.0649	1.0678	1.0706	1.0734	1.0763	1.0792	1.0821	1.0850	1.0880	1.0909	1.0939	60
1	0622	0650	0678	0706	0735	0763	0792	0821	0851	0880	0910	0940	59
2	0622	0650	0678	0707	0735	0764	0793	0822	0851	0881	0910	0940	58
3	0623	0651	0679	0707	0736	0764	0793	0822	0852	0881	0911	0941	57
4	0623	0651	0679	0708	0736	0765	0794	0823	0852	0882	0911	0941	56
5	1.0624	1.0652	1.0680	1.0708	1.0737	1.0765	1.0794	1.0823	1.0853	1.0882	1.0912	1.0942	55
6	0624	0652	0680	0709	0737	0766	0795	0824	0853	0883	0912	0942	54
7	0625	0653	0681	0709	0738	0766	0795	0824	0854	0883	0913	0943	53
8	0625	0653	0681	0710	0738	0767	0796	0825	0854	0883	0913	0943	52
9	0626	0654	0682	0710	0739	0767	0796	0825	0855	0884	0914	0944	51
10	1.0626	1.0654	1.0682	1.0711	1.0739	1.0768	1.0797	1.0826	1.0855	1.0884	1.0914	1.0944	50
11	0627	0655	0683	0711	0740	0768	0797	0826	0855	0885	0915	0945	49
12	0627	0655	0683	0711	0740	0769	0798	0827	0856	0885	0915	0945	48
13	0628	0655	0684	0712	0740	0769	0798	0827	0856	0886	0916	0946	47
14	0628	0656	0684	0712	0741	0770	0799	0828	0857	0886	0916	0946	46
15	1.0628	1.0656	1.0685	1.0713	1.0741	1.0770	1.0799	1.0828	1.0857	1.0887	1.0917	1.0947	45
16	0629	0657	0685	0713	0742	0771	0800	0829	0858	0887	0917	0947	44
17	0629	0657	0686	0714	0742	0771	0800	0829	0858	0888	0918	0948	43
18	0630	0658	0686	0714	0743	0772	0801	0830	0859	0888	0918	0948	42
19	0630	0658	0686	0715	0743	0772	0801	0830	0859	0889	0919	0949	41
20	1.0631	1.0659	1.0687	1.0715	1.0744	1.0773	1.0801	1.0831	1.0860	1.0889	1.0919	1.0949	40
21	0631	0659	0687	0716	0744	0773	0802	0831	0860	0890	0920	0950	39
22	0632	0660	0688	0716	0745	0774	0802	0832	0861	0890	0920	0950	38
23	0632	0660	0688	0717	0745	0774	0803	0832	0861	0891	0921	0951	37
24	0633	0661	0689	0717	0746	0774	0803	0833	0862	0891	0921	0951	36
25	1.0633	1.0661	1.0689	1.0718	1.0746	1.0775	1.0804	1.0833	1.0862	1.0892	1.0922	1.0952	35
26	0634	0662	0690	0718	0747	0775	0804	0834	0863	0893	0922	0952	34
27	0634	0662	0690	0719	0747	0776	0805	0834	0863	0893	0923	0953	33
28	0634	0663	0691	0719	0748	0776	0805	0834	0864	0894	0923	0953	32
29	0635	0663	0691	0720	0748	0777	0806	0835	0864	0894	0924	0954	31
30	1.0635	1.0663	1.0692	1.0720	1.0749	1.0777	1.0806	1.0835	1.0865	1.0895	1.0924	1.0954	30
31	0636	0664	0692	0721	0749	0778	0807	0836	0865	0895	0925	0955	29
32	0636	0664	0693	0721	0750	0778	0807	0836	0866	0896	0925	0955	28
33	0637	0665	0693	0721	0750	0779	0808	0837	0866	0896	0926	0956	27
34	0637	0665	0694	0722	0751	0779	0808	0837	0867	0897	0926	0956	26
35	1.0638	1.0666	1.0694	1.0722	1.0751	1.0780	1.0809	1.0838	1.0867	1.0897	1.0927	1.0957	25
36	0638	0666	0694	0723	0751	0780	0809	0838	0868	0898	0927	0957	24
37	0639	0667	0695	0723	0752	0781	0810	0839	0868	0898	0928	0958	23
38	0639	0667	0695	0724	0752	0781	0810	0839	0869	0899	0928	0958	22
39	0640	0668	0696	0724	0753	0782	0811	0840	0869	0899	0929	0959	21
40	1.0640	1.0668	1.0696	1.0725	1.0753	1.0782	1.0811	1.0840	1.0870	1.0899	1.0929	1.0959	20
41	0641	0669	0697	0725	0754	0783	0812	0841	0870	0900	0930	0960	19
42	0641	0669	0697	0726	0754	0783	0812	0841	0871	0900	0930	0960	18
43	0641	0670	0698	0726	0755	0784	0813	0842	0871	0901	0931	0961	17
44	0642	0670	0698	0727	0755	0784	0813	0842	0872	0901	0931	0961	16
45	1.0642	1.0670	1.0699	1.0727	1.0756	1.0785	1.0814	1.0843	1.0872	1.0902	1.0932	1.0962	15
46	0643	0671	0699	0728	0756	0785	0814	0843	0873	0902	0932	0962	14
47	0643	0671	0700	0728	0757	0786	0815	0844	0873	0903	0933	0963	13
48	0644	0672	0700	0729	0757	0786	0815	0844	0874	0903	0933	0963	12
49	0644	0672	0701	0729	0758	0787	0816	0845	0874	0904	0934	0964	11
50	1.0645	1.0673	1.0701	1.0730	1.0758	1.0787	1.0816	1.0845	1.0875	1.0904	1.0934	1.0964	10
51	0645	0673	0702	0730	0759	0787	0816	0846	0875	0905	0935	0965	9
52	0646	0674	0702	0730	0759	0788	0817	0846	0876	0905	0935	0965	8
53	0646	0674	0703	0731	0760	0788	0817	0847	0876	0906	0936	0966	7
54	0647	0675	0703	0731	0760	0789	0818	0847	0877	0906	0936	0966	6
55	1.0647	1.0675	1.0703	1.0732	1.0761	1.0789	1.0818	1.0848	1.0877	1.0907	1.0937	1.0967	5
56	0648	0676	0704	0732	0761	0790	0819	0848	0878	0907	0937	0967	4
57	0648	0676	0704	0733	0762	0790	0819	0849	0878	0908	0938	0968	3
58	0648	0677	0705	0733	0762	0791	0820	0849	0879	0908	0938	0968	2
59	0649	0677	0705	0734	0762	0791	0820	0850	0879	0909	0939	0969	1
60	0649	0678	0706	0734	0763	0792	0821	0850	0880	0909	0939	0969	0
	35′	34′	33′	32′	31′	30′	29′	28′	27′	26′	25′	24′	S.
	7 DEGREES.												

When the Apparent Distance is *less* than 90°, the Second Correction is to be taken from the Bottom.

TABLE XVII.

LOGARITHMS of the FIRST and SECOND CORRECTIONS.

The First Correction is *always* to be taken from the Top, and also the Second, when the Apparent Distance is *greater* than 90°.

2 DEGREES.

S.	36′	37′	38′	39′	40′	41′	42′	43′	44′	45′	46′	47′	
0	1.0969	1.0999	1.1030	1.1061	1.1091	1.1123	1.1154	1.1186	1.1217	1.1249	1.1282	1.1314	60
1	0970	1000	1030	1061	1092	1123	1154	1186	1218	1250	1282	1315	59
2	0970	1000	1031	1062	1092	1124	1155	1187	1218	1250	1283	1315	58
3	0971	1001	1031	1062	1093	1124	1156	1187	1219	1251	1283	1316	57
4	0971	1001	1032	1063	1094	1125	1156	1188	1219	1252	1284	1316	56
5	1.0972	1.1002	1.1032	1.1063	1.1094	1.1125	1.1157	1.1188	1.1220	1.1252	1.1284	1.1317	55
6	0972	1002	1032	1064	1095	1126	1157	1189	1221	1253	1285	1317	54
7	0973	1003	1033	1064	1095	1126	1158	1189	1221	1253	1285	1318	53
8	0973	1003	1034	1065	1096	1127	1158	1190	1222	1254	1286	1319	52
9	0974	1004	1034	1065	1096	1127	1159	1190	1222	1254	1287	1319	51
10	1.0974	1.1004	1.1035	1.1066	1.1097	1.1128	1.1159	1.1191	1.1223	1.1255	1.1287	1.1320	50
11	0975	1005	1035	1066	1097	1128	1160	1191	1223	1255	1288	1320	49
12	0975	1005	1036	1067	1098	1129	1160	1192	1224	1256	1288	1321	48
13	0976	1006	1036	1067	1098	1129	1161	1192	1224	1256	1289	1321	47
14	0976	1006	1037	1068	1099	1130	1161	1193	1225	1257	1289	1322	46
15	1.0977	1.1007	1.1037	1.1068	1.1099	1.1130	1.1162	1.1193	1.1225	1.1257	1.1290	1.1322	45
16	0977	1007	1038	1069	1100	1131	1162	1194	1226	1258	1290	1323	44
17	0978	1008	1039	1069	1100	1131	1163	1195	1226	1259	1291	1323	43
18	0978	1008	1039	1070	1101	1132	1163	1195	1227	1259	1291	1324	42
19	0979	1009	1040	1070	1101	1132	1164	1196	1227	1260	1292	1325	41
20	1.0979	1.1009	1.1040	1.1071	1.1102	1.1133	1.1164	1.1196	1.1228	1.1260	1.1292	1.1325	40
21	0980	1010	1041	1071	1102	1134	1165	1197	1229	1261	1293	1326	39
22	0980	1011	1041	1072	1103	1134	1165	1197	1229	1261	1294	1326	38
23	0981	1011	1042	1072	1103	1135	1166	1198	1230	1262	1294	1327	37
24	0981	1012	1042	1073	1104	1135	1167	1198	1230	1262	1295	1327	36
25	1.0982	1.1012	1.1043	1.1073	1.1104	1.1136	1.1167	1.1199	1.1231	1.1263	1.1295	1.1328	35
26	0982	1013	1043	1074	1165	1136	1168	1199	1231	1264	1296	1328	34
27	0983	1013	1044	1074	1105	1137	1168	1200	1232	1264	1296	1329	33
28	0983	1014	1044	1075	1106	1137	1169	1200	1232	1265	1297	1329	32
29	0984	1014	1045	1075	1106	1138	1169	1201	1233	1265	1297	1330	31
30	1.0984	1.1015	1.1045	1.1076	1.1107	1.1138	1.1170	1.1201	1.1233	1.1266	1.1298	1.1331	30
31	0985	1016	1046	1076	1108	1139	1170	1202	1234	1266	1298	1331	29
32	0985	1016	1046	1077	1108	1139	1171	1202	1234	1267	1299	1332	28
33	0986	1017	1047	1078	1109	1140	1171	1203	1235	1267	1300	1332	27
34	0986	1017	1047	1078	1110	1140	1172	1204	1235	1268	1300	1333	26
35	1.0987	1.1018	1.1048	1.1079	1.1110	1.1141	1.1172	1.1204	1.1236	1.1268	1.1301	1.1333	25
36	0987	1018	1048	1079	1111	1141	1173	1205	1237	1269	1301	1334	24
37	0988	1019	1049	1080	1111	1142	1173	1205	1237	1269	1302	1334	23
38	0988	1019	1049	1080	1112	1142	1174	1206	1238	1270	1302	1335	22
39	0989	1020	1050	1081	1112	1143	1174	1206	1238	1270	1303	1335	21
40	1.0989	1.1020	1.1050	1.1081	1.1112	1.1143	1.1175	1.1207	1.1239	1.1271	1.1303	1.1336	20
41	0990	1021	1051	1082	1113	1144	1175	1207	1239	1271	1304	1337	19
42	0990	1021	1051	1082	1113	1145	1176	1208	1240	1272	1304	1337	18
43	0991	1022	1052	1083	1114	1145	1177	1208	1240	1273	1305	1338	17
44	0991	1022	1052	1083	1114	1146	1177	1209	1241	1273	1306	1338	16
45	1.0992	1.1023	1.1053	1.1084	1.1115	1.1146	1.1178	1.1209	1.1241	1.1274	1.1306	1.1339	15
46	0992	1023	1053	1084	1115	1147	1178	1210	1242	1274	1307	1339	14
47	0993	1024	1054	1085	1116	1147	1179	1210	1242	1275	1307	1340	13
48	0993	1024	1054	1085	1116	1148	1179	1211	1243	1275	1308	1340	12
49	0994	1025	1055	1086	1117	1148	1180	1211	1243	1276	1308	1341	11
50	1.0994	1.1025	1.1055	1.1086	1.1117	1.1149	1.1180	1.1212	1.1244	1.1276	1.1309	1.1342	10
51	0995	1026	1056	1087	1118	1149	1181	1213	1245	1277	1309	1342	9
52	0995	1026	1056	1087	1118	1150	1181	1213	1245	1277	1310	1343	8
53	0996	1027	1057	1088	1119	1150	1182	1214	1246	1278	1310	1343	7
54	0996	1027	1057	1088	1119	1151	1182	1214	1246	1278	1311	1344	6
55	1.0997	1.1028	1.1058	1.1089	1.1120	1.1151	1.1183	1.1215	1.1247	1.1279	1.1311	1.1344	5
56	0997	1028	1058	1089	1120	1152	1183	1215	1247	1280	1312	1345	4
57	0998	1028	1059	1090	1121	1152	1184	1216	1248	1280	1313	1345	3
58	0998	1029	1060	1090	1122	1153	1184	1216	1248	1281	1313	1346	2
59	0999	1029	1060	1091	1122	1153	1185	1217	1249	1281	1314	1346	1
60	0999	1030	1061	1091	1123	1154	1186	1217	1249	1282	1314	1347	0
	23′	22′	21′	20′	19′	18′	17′	16′	15′	14′	13′	12′	S.

7 DEGREES.

When the Apparent Distance is *less* than 90°, the Second Correction is to be taken from the Bottom.

TABLE XVII.

LOGARITHMS of the FIRST and SECOND CORRECTIONS

The First Correction is *always* to be taken from the Top, and also the Second, when the Apparent Distance is *greater* than 90°.

2 DEGREES.

S.	48′	49′	50′	51′	52′	53′	54′	55′	56′	57′	58′	59′	
0	1.1347	1.1380	1.1413	1.1447	1.1481	1.1515	1.1549	1.1584	1.1619	1.1654	1.1689	1.1725	60
1	1348	1381	1414	1447	1481	1515	1550	1584	1619	1654	1690	1725	59
2	1348	1381	1414	1448	1482	1516	1550	1585	1620	1655	1690	1726	58
3	1349	1382	1415	1449	1482	1516	1551	1585	1620	1655	1691	1727	57
4	1349	1382	1416	1449	1483	1517	1551	1586	1621	1656	1692	1727	56
5	1.1350	1.1383	1.1416	1.1450	1.1483	1.1518	1.1552	1.1587	1.1621	1.1657	1.1692	1.1728	55
6	1350	1383	1417	1450	1484	1518	1552	1587	1622	1657	1693	1728	54
7	1351	1384	1417	1451	1485	1519	1553	1588	1623	1658	1693	1729	53
8	1351	1384	1418	1451	1485	1519	1554	1588	1623	1658	1694	1730	52
9	1352	1385	1418	1452	1486	1520	1554	1589	1624	1659	1694	1730	51
10	1.1352	1.1386	1.1419	1.1452	1.1486	1.1520	1.1555	1.1589	1.1624	1.1660	1.1695	1.1731	50
11	1353	1386	1419	1453	1487	1521	1555	1590	1625	1660	1696	1731	49
12	1354	1387	1420	1454	1487	1522	1556	1591	1625	1661	1696	1732	48
13	1354	1387	1421	1454	1488	1522	1556	1591	1626	1661	1697	1733	47
14	1355	1388	1421	1455	1489	1523	1557	1592	1627	1662	1697	1733	46
15	1.1355	1.1388	1.1422	1.1455	1.1489	1.1523	1.1558	1.1592	1.1627	1.1663	1.1698	1.1734	45
16	1356	1389	1422	1456	1490	1524	1558	1593	1628	1663	1699	1734	44
17	1356	1389	1423	1456	1490	1524	1559	1593	1628	1664	1699	1735	43
18	1357	1390	1423	1457	1491	1525	1559	1594	1629	1664	1700	1736	42
19	1357	1391	1424	1458	1491	1526	1560	1595	1630	1665	1700	1736	41
20	1.1358	1.1391	1.1424	1.1458	1.1492	1.1526	1.1561	1.1595	1.1630	1.1665	1.1701	1.1737	40
21	1359	1392	1425	1459	1493	1527	1561	1596	1631	1666	1702	1737	39
22	1359	1392	1426	1459	1493	1527	1562	1596	1631	1667	1702	1738	38
23	1360	1393	1426	1460	1494	1528	1562	1597	1632	1667	1703	1739	37
24	1360	1393	1427	1460	1494	1528	1563	1598	1633	1668	1703	1739	36
25	1.1361	1.1394	1.1427	1.1461	1.1495	1.1529	1.1563	1.1598	1.1633	1.1668	1.1704	1.1740	35
26	1361	1394	1428	1461	1495	1530	1564	1599	1634	1669	1705	1740	34
27	1362	1395	1428	1462	1496	1530	1565	1599	1634	1670	1705	1741	33
28	1362	1396	1429	1463	1496	1531	1565	1600	1635	1670	1706	1742	32
29	1363	1396	1429	1463	1497	1531	1566	1600	1635	1671	1706	1742	31
30	1.1363	1.1397	1.1430	1.1464	1.1498	1.1532	1.1566	1.1601	1.1636	1.1671	1.1707	1.1743	30
31	1364	1397	1431	1464	1498	1532	1567	1602	1637	1672	1708	1743	29
32	1365	1398	1431	1465	1499	1533	1567	1602	1637	1673	1708	1744	28
33	1365	1398	1432	1465	1499	1534	1568	1603	1638	1673	1709	1745	27
34	1366	1399	1432	1466	1500	1534	1569	1603	1638	1674	1709	1745	26
35	1.1366	1.1399	1.1433	1.1467	1.1500	1.1535	1.1569	1.1604	1.1639	1.1675	1.1710	1.1746	25
36	1367	1400	1433	1467	1501	1535	1570	1605	1640	1675	1711	1746	24
37	1367	1401	1434	1468	1502	1536	1570	1605	1640	1676	1711	1747	23
38	1368	1401	1435	1468	1502	1536	1571	1606	1641	1676	1712	1748	22
39	1368	1402	1435	1469	1503	1537	1571	1606	1641	1677	1712	1748	21
40	1.1369	1.1402	1.1436	1.1469	1.1503	1.1538	1.1572	1.1607	1.1642	1.1677	1.1713	1.1749	20
41	1370	1403	1436	1470	1504	1538	1573	1607	1643	1678	1714	1749	19
42	1370	1403	1437	1470	1504	1539	1573	1608	1643	1678	1714	1750	18
43	1371	1404	1437	1471	1505	1539	1574	1609	1644	1679	1715	1751	17
44	1371	1404	1438	1472	1506	1540	1574	1609	1644	1680	1715	1751	16
45	1.1372	1.1405	1.1438	1.1472	1.1506	1.1540	1.1575	1.1610	1.1645	1.1680	1.1716	1.1752	15
46	1372	1405	1439	1473	1507	1541	1576	1610	1645	1681	1717	1752	14
47	1373	1406	1440	1473	1507	1542	1576	1611	1646	1681	1717	1753	13
48	1373	1406	1440	1474	1508	1542	1577	1612	1647	1682	1718	1754	12
49	1374	1407	1441	1474	1508	1543	1577	1612	1647	1683	1718	1754	11
50	1.1374	1.1407	1.1441	1.1475	1.1509	1.1543	1.1578	1.1613	1.1648	1.1683	1.1719	1.1755	10
51	1375	1408	1442	1476	1510	1544	1578	1613	1648	1684	1719	1755	9
52	1376	1408	1442	1476	1510	1544	1579	1614	1649	1684	1720	1756	8
53	1376	1409	1443	1477	1511	1545	1580	1614	1650	1685	1721	1757	7
54	1377	1409	1443	1477	1511	1546	1580	1615	1650	1686	1721	1757	6
55	1.1377	1.1410	1.1444	1.1478	1.1512	1.1546	1.1581	1.1616	1.1651	1.1686	1.1722	1.1758	5
56	1378	1411	1445	1478	1512	1547	1581	1616	1651	1687	1722	1759	4
57	1378	1411	1445	1479	1513	1547	1582	1617	1652	1687	1723	1759	3
58	1379	1412	1446	1479	1514	1548	1582	1617	1652	1688	1724	1760	2
59	1379	1412	1446	1480	1514	1548	1583	1618	1653	1689	1724	1760	1
60	1380	1413	1447	1481	1515	1549	1584	1619	1654	1689	1725	1761	0
	11′	10′	9′	8′	7′	6′	5′	4′	3′	2′	1′	0′	S.

7 DEGREES.

When the Apparent Distance is *less* than 90°, the Second Correction is to be taken from the Bottom.

TABLE XVII.

Logarithms of the First and Second Corrections.

The First Correction is *always* to be taken from the Top, and also the Second, when the Apparent Distance is *greater* than 90°.

	3 DEGREES.											
S.	0′	1′	2′	3′	4′	5′	6′	7′	8′	9′	10′	11′	
0	1.1761	1.1797	1.1834	1.1871	1.1908	1.1946	1.1984	1.2022	1.2061	1.2099	1.2139	1.2178	60
1	1762	1798	1835	1871	1909	1946	1984	2023	2061	2100	2139	2179	59
2	1762	1798	1835	1872	1909	1947	1985	2023	2062	2101	2140	2180	58
3	1763	1799	1836	1873	1910	1948	1986	2024	2062	2101	2141	2180	57
4	1763	1800	1836	1873	1911	1948	1986	2025	2063	2102	2141	2181	56
5	1.1764	1.1800	1.1837	1.1874	1.1911	1.1949	1.1987	1.2025	1.2064	1.2103	1.2142	1.2182	55
6	1765	1801	1838	1875	1912	1950	1987	2026	2064	2103	2143	2182	54
7	1765	1802	1838	1875	1913	1950	1988	2026	2065	2104	2143	2183	53
8	1766	1802	1839	1876	1913	1951	1989	2027	2066	2105	2144	2184	52
9	1766	1803	1839	1876	1914	1951	1989	2028	2066	2105	2145	2184	51
10	1.1767	1.1803	1.1840	1.1877	1.1914	1.1952	1.1990	1.2028	1.2067	1.2106	1.2145	1.2185	50
11	1768	1804	1841	1878	1915	1953	1991	2029	2068	2107	2146	2186	49
12	1768	1805	1841	1878	1916	1953	1991	2030	2068	2107	2147	2186	48
13	1769	1805	1842	1879	1916	1954	1992	2030	2069	2108	2147	2187	47
14	1769	1806	1843	1880	1917	1955	1993	2031	2070	2109	2148	2188	46
15	1.1770	1.1806	1.1843	1.1880	1.1918	1.1955	1.1994	1.2032	1.2070	1.2109	1.2149	1.2188	45
16	1771	1807	1844	1881	1918	1956	1994	2032	2071	2110	2149	2189	44
17	1771	1808	1844	1881	1919	1956	1995	2033	2072	2111	2150	2190	43
18	1772	1808	1845	1882	1919	1957	1996	2033	2072	2111	2151	2190	42
19	1772	1809	1846	1883	1920	1958	1996	2034	2073	2112	2151	2191	41
20	1.1773	1.1809	1.1846	1.1883	1.1921	1.1959	1.1997	1.2035	1.2073	1.2113	1.2152	1.2192	40
21	1774	1810	1847	1884	1921	1960	1997	2035	2074	2113	2153	2192	39
22	1774	1811	1847	1884	1922	1960	1998	2036	2075	2114	2153	2193	38
23	1775	1811	1848	1885	1923	1961	1998	2037	2075	2115	2154	2194	37
24	1775	1812	1849	1886	1923	1962	1999	2037	2076	2115	2155	2194	36
25	1.1776	1.1812	1.1849	1.1886	1.1924	1.1962	1.2000	1.2038	1.2077	1.2116	1.2155	1.2195	35
26	1777	1813	1850	1887	1924	1963	2000	2039	2078	2116	2156	2196	34
27	1777	1814	1850	1888	1925	1963	2001	2039	2079	2117	2157	2196	33
28	1778	1814	1851	1888	1926	1964	2001	2040	2079	2118	2157	2197	32
29	1778	1815	1852	1889	1926	1964	2002	2041	2080	2118	2158	2198	31
30	1.1779	1.1816	1.1852	1.1889	1.1927	1.1965	1.2003	1.2041	1.2080	1.2119	1.2159	1.2198	30
31	1780	1816	1853	1890	1928	1965	2003	2042	2081	2120	2159	2199	29
32	1780	1817	1854	1891	1928	1966	2004	2042	2081	2120	2160	2200	28
33	1781	1817	1854	1891	1929	1967	2005	2043	2082	2121	2161	2200	27
34	1781	1818	1855	1892	1929	1967	2005	2044	2083	2122	2161	2201	26
35	1.1782	1.1819	1.1856	1.1893	1.1930	1.1968	1.2006	1.2044	1.2083	1.2122	1.2162	1.2202	25
36	1783	1819	1857	1893	1931	1968	2007	2045	2084	2123	2163	2202	24
37	1783	1820	1857	1894	1931	1969	2007	2046	2085	2124	2163	2203	23
38	1784	1820	1858	1894	1932	1970	2008	2046	2085	2124	2164	2204	22
39	1785	1821	1858	1895	1933	1970	2009	2047	2086	2125	2165	2204	21
40	1.1785	1.1822	1.1859	1.1896	1.1933	1.1971	1.2009	1.2048	1.2086	1.2126	1.2165	1.2205	20
41	1786	1822	1859	1896	1934	1972	2010	2048	2087	2126	2166	2206	19
42	1786	1823	1860	1897	1934	1972	2010	2049	2088	2127	2167	2206	18
43	1787	1823	1860	1898	1935	1973	2011	2050	2088	2128	2167	2207	17
44	1788	1824	1861	1898	1936	1974	2012	2050	2089	2128	2168	2208	16
45	1.1788	1.1825	1.1862	1.1899	1.1936	1.1974	1.2012	1.2051	1.2090	1.2129	1.2169	1.2208	15
46	1789	1825	1862	1899	1937	1975	2013	2052	2090	2130	2169	2209	14
47	1789	1826	1863	1900	1938	1975	2014	2052	2091	2130	2170	2210	13
48	1790	1827	1863	1901	1938	1976	2014	2053	2092	2131	2170	2210	12
49	1791	1827	1864	1901	1939	1977	2015	2053	2092	2132	2171	2211	11
50	1.1791	1.1828	1.1865	1.1902	1.1939	1.1977	1.2016	1.2054	1.2093	1.2132	1.2172	1.2212	10
51	1792	1828	1865	1903	1940	1978	2016	2055	2094	2133	2172	2212	9
52	1792	1829	1866	1903	1941	1979	2017	2055	2094	2134	2173	2213	8
53	1793	1830	1867	1904	1941	1979	2017	2056	2095	2134	2174	2214	7
54	1794	1830	1867	1904	1942	1980	2018	2057	2096	2135	2174	2214	6
55	1.1794	1.1831	1.1868	1.1905	1.1942	1.1981	1.2019	1.2057	1.2096	1.2136	1.2175	1.2215	5
56	1795	1831	1868	1906	1943	1981	2019	2058	2097	2136	2176	2216	4
57	1795	1832	1869	1906	1944	1982	2020	2059	2098	2137	2176	2216	3
58	1796	1833	1870	1907	1944	1982	2021	2059	2098	2137	2177	2217	2
59	1797	1833	1870	1908	1945	1983	2021	2060	2099	2138	2178	2218	1
60	1797	1834	1871	1908	1946	1984	2022	2061	2099	2139	2178	2218	0
	59′	58′	57′	56′	55′	54′	53′	52′	51′	50′	49′	48′	S.
	6 DEGREES.												

When the Apparent Distance is *less* than 90°, the Second Correction is to be taken from the Bottom.

TABLE XVII.

Logarithms of the First and Second Corrections.

The First Correction is *always* to be taken from the Top, and also the Second, when the Apparent Distance is *greater* than 90°.

3 DEGREES.

S.	12′	13′	14′	15′	16′	17′	18′	19′	20′	21′	22′	23′	
0	1.2218	1.2259	1.2300	1.2341	1.2382	1.2424	1.2467	1.2510	1.2553	1.2596	1.2640	1.2685	60
1	2219	2260	2300	2342	2383	2425	2467	2510	2553	2597	2641	2686	59
2	2220	2260	2301	2342	2384	2426	2468	2511	2554	2598	2642	2687	58
3	2220	2261	2302	2343	2384	2426	2469	2512	2555	2599	2643	2688	57
4	2221	2262	2302	2344	2385	2427	2470	2512	2556	2599	2643	2688	56
5	1.2222	1.2262	1.2303	1.2344	1.2386	1.2428	1.2470	1.2513	1.2556	1.2600	1.2644	1.2689	55
6	2223	2263	2304	2345	2387	2429	2471	2514	2557	2601	2645	2689	54
7	2223	2264	2304	2346	2387	2429	2472	2515	2558	2601	2646	2690	53
8	2224	2264	2305	2346	2388	2430	2472	2515	2559	2602	2646	2691	52
9	2225	2265	2306	2347	2389	2431	2473	2516	2559	2603	2647	2692	51
10	1.2225	1.2266	1.2307	1.2348	1.2389	1.2431	1.2474	1.2517	1.2560	1.2604	1.2648	1.2692	50
11	2226	2266	2307	2348	2390	2432	2475	2517	2561	2604	2649	2693	49
12	2227	2267	2308	2349	2391	2433	2475	2518	2561	2605	2649	2694	48
13	2227	2268	2309	2350	2391	2433	2476	2519	2562	2606	2650	2695	47
14	2228	2268	2309	2350	2392	2434	2477	2520	2563	2607	2651	2695	46
15	1.2229	1.2269	1.2310	1.2351	1.2393	1.2435	1.2477	1.2520	1.2564	1.2607	1.2652	1.2696	45
16	2229	2270	2311	2352	2394	2436	2478	2521	2564	2608	2652	2697	44
17	2230	2270	2312	2353	2394	2436	2479	2522	2565	2609	2653	2698	43
18	2231	2271	2313	2353	2395	2437	2480	2522	2566	2610	2654	2698	42
19	2231	2272	2313	2354	2396	2438	2480	2523	2566	2610	2655	2699	41
20	1.2232	1.2272	1.2314	1.2355	1.2396	1.2438	1.2481	1.2524	1.2567	1.2611	1.2655	1.2700	40
21	2233	2273	2315	2355	2397	2439	2482	2525	2568	2612	2656	2701	39
22	2233	2274	2315	2356	2398	2440	2482	2525	2569	2612	2657	2701	38
23	2234	2274	2316	2357	2398	2441	2483	2526	2569	2613	2657	2702	37
24	2235	2275	2317	2357	2399	2441	2484	2527	2570	2614	2658	2703	36
25	1.2235	1.2276	1.2317	1.2358	1.2400	1.2442	1.2485	1.2527	1.2571	1.2615	1.2659	1.2704	35
26	2236	2277	2318	2359	2401	2443	2485	2528	2572	2615	2660	2704	34
27	2237	2277	2319	2359	2401	2443	2486	2529	2572	2616	2660	2705	33
28	2237	2278	2320	2360	2402	2444	2487	2530	2573	2617	2661	2706	32
29	2238	2279	2320	2361	2403	2445	2487	2530	2574	2618	2662	2707	31
30	1.2239	1.2279	1.2321	1.2362	1.2403	1.2445	1.2488	1.2531	1.2574	1.2618	1.2663	1.2707	30
31	2239	2280	2321	2362	2404	2446	2489	2532	2575	2619	2663	2708	29
32	2240	2281	2322	2363	2405	2447	2489	2533	2576	2620	2664	2709	28
33	2241	2281	2322	2364	2405	2448	2490	2533	2577	2621	2665	2710	27
34	2241	2282	2323	2364	2406	2448	2491	2534	2577	2621	2666	2710	26
35	1.2242	1.2283	1.2324	1.2365	1.2407	1.2449	1.2492	1.2535	1.2578	1.2622	1.2666	1.2711	25
36	2243	2283	2324	2366	2408	2450	2492	2535	2579	2623	2667	2712	24
37	2243	2284	2325	2366	2408	2450	2493	2536	2580	2624	2668	2713	23
38	2244	2285	2326	2367	2409	2451	2494	2537	2580	2624	2669	2713	22
39	2245	2285	2326	2368	2410	2452	2494	2538	2581	2625	2669	2714	21
40	1.2245	1.2286	1.2327	1.2368	1.2410	1.2453	1.2495	1.2538	1.2582	1.2626	1.2670	1.2715	20
41	2246	2287	2328	2369	2411	2453	2496	2539	2583	2626	2671	2716	19
42	2247	2287	2328	2370	2412	2454	2497	2540	2583	2627	2672	2716	18
43	2247	2288	2329	2371	2412	2455	2497	2540	2584	2628	2672	2717	17
44	2248	2289	2330	2371	2413	2455	2498	2541	2585	2629	2673	2718	16
45	1.2249	1.2289	1.2331	1.2372	1.2414	1.2456	1.2499	1.2542	1.2585	1.2629	1.2674	1.2719	15
46	2249	2290	2331	2373	2415	2457	2499	2543	2586	2630	2675	2719	14
47	2250	2291	2332	2373	2415	2458	2500	2543	2587	2631	2675	2720	13
48	2251	2291	2333	2374	2416	2458	2501	2544	2588	2632	2676	2721	12
49	2251	2292	2333	2375	2417	2459	2502	2545	2588	2632	2677	2722	11
50	1.2252	1.2293	1.2334	1.2375	1.2417	1.2460	1.2502	1.2545	1.2589	1.2633	1.2678	1.2722	10
51	2253	2294	2335	2376	2418	2460	2503	2546	2590	2634	2678	2723	9
52	2253	2294	2335	2377	2419	2461	2504	2547	2591	2635	2679	2724	8
53	2254	2295	2336	2378	2419	2462	2504	2548	2591	2635	2680	2725	7
54	2255	2296	2337	2378	2420	2462	2505	2548	2592	2636	2681	2725	6
55	1.2256	1.2296	1.2337	1.2379	1.2421	1.2463	1.2506	1.2549	1.2593	1.2637	1.2681	1.2726	5
56	2256	2297	2338	2380	2422	2464	2507	2550	2593	2638	2682	2727	4
57	2257	2298	2339	2380	2422	2465	2507	2551	2594	2638	2683	2728	3
58	2258	2298	2339	2381	2423	2465	2508	2551	2595	2639	2684	2729	2
59	2258	2299	2340	2382	2424	2466	2509	2552	2596	2640	2684	2729	1
60	2259	2300	2341	2382	2424	2467	2510	2553	2596	2640	2685	2730	0
	47′	46′	45′	44′	43′	42′	41′	40′	39′	38′	37′	36′	S.

6 DEGREES.

When the Apparent Distance is *less* than 90°, the Second Correction is to be taken from the Bottom.

TABLE XVII.

LOGARITHMS of the FIRST and SECOND CORRECTIONS

The First Correction is *always* to be taken from the Top, and also the Second, when the Apparent Distance is *greater* than 90°.

3 DEGREES.

S.	24′	25′	26′	27′	28′	29′	30′	31′	32′	33′	34′	35′	
0	1.2730	1.2775	1.2821	1.2868	1.2915	1.2962	1.3010	1.3059	1.3108	1.3158	1.3208	1.3259	60
1	2731	2776	2822	2869	2916	2963	3011	3060	3109	3158	3209	3259	59
2	2732	2777	2823	2869	2916	2964	3012	3060	3110	3159	3209	3260	58
3	2732	2778	2824	2870	2917	2965	3013	3061	3110	3160	3210	3261	57
4	2733	2779	2825	2871	2918	2965	3014	3062	3111	3161	3211	3262	56
5	1.2734	1.2779	1.2825	1.2872	1.2919	1.2966	1.3014	1.3063	1.3112	1.3162	1.3212	1.3263	55
6	2735	2780	2826	2873	2920	2967	3015	3064	3113	3163	3213	3264	54
7	2735	2781	2827	2873	2920	2968	3016	3065	3114	3163	3214	3265	53
8	2736	2782	2828	2874	2921	2969	3017	3065	3114	3164	3214	3265	52
9	2737	2782	2828	2875	2922	2969	3018	3066	3115	3165	3215	3266	51
10	1.2738	1.2783	1.2829	1.2876	1.6923	1.2970	1.3018	1.3067	1.3116	1.3166	1.3216	1.3267	50
11	2738	2784	2830	2876	2924	2971	3019	3068	3117	3167	3217	3268	49
12	2739	2785	2831	2877	2924	2972	3020	3069	3118	3168	3218	3269	48
13	2740	2785	2831	2878	2925	2973	3021	3069	3119	3168	3219	3270	47
14	2741	2786	2832	2879	2926	2973	3022	3070	3119	3169	3220	3270	46
15	1.2741	1.2787	1.2833	1.2880	1.2927	1.2974	1.3022	1.3071	1.3120	1.3170	1.3220	1.3271	45
16	2742	2788	2834	2880	2927	2975	3023	3072	3121	3171	3221	3272	44
17	2743	2788	2835	2881	2928	2976	3024	3073	3122	3172	3222	3273	43
18	2744	2789	2835	2882	2929	2977	3025	3073	3123	3173	3223	3274	42
19	2744	2790	2836	2883	2930	2977	3026	3074	3124	3173	3224	3275	41
20	1.2745	1.2791	1.2837	1.2883	1.2931	1.2978	1.3026	1.3075	1.3124	1.3174	1.3225	1.3276	40
21	2746	2792	2838	2884	2931	2979	3027	3076	3125	3175	3225	3276	39
22	2747	2792	2838	2885	2932	2980	3028	3077	3126	3176	3226	3277	38
23	2747	2793	2839	2886	2933	2981	3029	3078	3127	3177	3227	3278	37
24	2748	2794	2840	2887	2934	2981	3030	3078	3128	3178	3228	3279	36
25	1.2749	1.2795	1.2841	1.2887	1.2935	1.2982	1.3030	1.3079	1.3129	1.3178	1.3229	1.3280	35
26	2750	2795	2841	2888	2935	2983	3031	3080	3129	3179	3230	3281	34
27	2750	2796	2842	2889	2936	2984	3032	3081	3130	3180	3231	3282	33
28	2751	2797	2843	2890	2937	2985	3033	3082	3131	3181	3231	3282	32
29	2752	2798	2844	2891	2938	2985	3034	3082	3132	3182	3232	3283	31
30	1.2753	1.2798	1.2845	1.2891	1.2939	1.2986	1.3034	1.3083	1.3132	1.3183	1.3233	1.3284	30
31	2753	2799	2845	2892	2939	2987	3035	3084	3133	3183	3234	3285	29
32	2754	2800	2846	2893	2940	2988	3036	3085	3134	3184	3235	3286	28
33	2755	2801	2847	2894	2941	2989	3037	3086	3135	3185	3236	3287	27
34	2756	2801	2848	2894	2942	2989	3038	3087	3136	3186	3236	3288	26
35	1.2756	1.2802	1.2848	1.2895	1.2942	1.2990	1.3039	1.3087	1.3137	1.3187	1.3237	1.3288	25
36	2757	2803	2849	2896	2943	2991	3039	3088	3138	3188	3238	3289	24
37	2758	2804	2850	2897	2944	2992	3040	3089	3138	3188	3239	3290	23
38	2759	2805	2851	2898	2945	2993	3041	3090	3139	3189	3240	3291	22
39	2760	2805	2852	2898	2946	2993	3042	3091	3140	3190	3241	3292	21
40	1.2760	1.2806	1.2852	1.2899	1.2946	1.2994	1.3043	1.3091	1.3141	1.3191	1.3242	1.3293	20
41	2761	2807	2853	2900	2947	2995	3043	3092	3142	3192	3242	3294	19
42	2762	2808	2854	2901	2948	2996	3044	3093	3143	3193	3243	3294	18
43	2763	2808	2855	2901	2949	2997	3045	3094	3143	3193	3244	3295	17
44	2763	2809	2855	2902	2950	2997	3046	3095	3144	3194	3245	3296	16
45	1.2764	1.2810	1.2856	1.2903	1.2950	1.2998	1.3047	1.3096	1.3145	1.3195	1.3246	1.3297	15
46	2765	2811	2857	2904	2951	2999	3047	3096	3146	3196	3247	3298	14
47	2766	2811	2858	2905	2952	3000	3048	3097	3147	3197	3247	3299	13
48	2766	2812	2859	2905	2953	3001	3049	3098	3148	3198	3248	3200	12
49	2767	2813	2859	2906	2954	3001	3050	3099	3148	3198	3249	3200	11
50	1.2768	1.2814	1.2860	1.2907	1.2954	1.3002	1.3051	1.3100	1.3149	1.3199	1.3250	1.3301	10
51	2769	2815	2861	2908	2955	3003	3052	3101	3150	3200	3251	3302	9
52	2769	2815	2862	2909	2956	3004	3052	3101	3151	3201	3252	3303	8
53	2770	2816	2862	2909	2957	3005	3053	3102	3152	3202	3253	3304	7
54	2771	2817	2863	2910	2958	3005	3054	3103	3153	3203	3253	3305	6
55	1.2772	1.2818	1.2864	1.2911	1.2958	1.3006	1.3055	1.3104	1.3153	1.3204	1.3254	1.3306	5
56	2772	2818	2865	2912	2959	3007	3056	3105	3154	3204	3255	3306	4
57	2773	2819	2866	2912	2960	3008	3056	3105	3155	3205	3256	3307	3
58	2774	2820	2866	2913	2961	3009	3057	3106	3156	3206	3257	3308	2
59	2775	2821	2867	2914	2962	3009	3058	3107	3157	3207	3258	3309	1
60	2775	2821	2868	2915	2962	3010	3059	3108	3158	3208	3259	3310	0
	35′	34′	33′	32′	31′	30′	29′	28′	27′	26′	25′	24′	S.

6 DEGREES.

When the Apparent Distance is *less* than 90°, the Second Correction is to be taken from the Bottom

TABLE XVII.

LOGARITHMS of the FIRST and SECOND CORRECTIONS.

The First Correction is *always* to be taken from the Top, and also the Second, when the Apparent Distance is *greater* than 90°.

3 DEGREES.

S.	36′	37′	38′	39′	40′	41′	42′	43′	44′	45′	46′	47′	
0	1.3310	1.3362	1.3415	1.3468	1.3522	1.3576	1.3632	1.3688	1.3745	1.3802	1.3860	1.3919	60
1	3311	3363	3415	3469	3523	3577	3633	3689	3746	3803	3861	3920	59
2	3312	3364	3416	3470	3524	3578	3634	3690	3746	3804	3862	3921	58
3	3313	3365	3417	3471	3525	3579	3635	3691	3747	3805	3863	3922	57
4	3313	3365	3418	3471	3525	3580	3635	3692	3748	3806	3864	3923	56
5	1.3314	1.3366	1.3419	1.3472	1.3526	1.3581	1.3636	1.3693	1.3749	1.3807	1.3865	1.3924	55
6	3315	3367	3420	3473	3527	3582	3637	3694	3750	3808	3866	3925	54
7	3316	3368	3421	3474	3528	3583	3638	3695	3751	3809	3867	3926	53
8	3317	3369	3422	3475	3529	3584	3639	3695	3752	3810	3868	3927	52
9	3318	3370	3423	3476	3530	3585	3640	3696	3753	3811	3869	3928	51
10	1.3319	1.3371	1.3423	1.3477	1.3531	1.3586	1.3641	1.3697	1.3754	1.3812	1.3870	1.3929	50
11	3319	3372	3424	3478	3532	3587	3642	3698	3755	3813	3871	3930	49
12	3320	3372	3425	3479	3533	3587	3643	3699	3756	3814	3872	3931	48
13	3321	3373	3426	3480	3534	3588	3644	3700	3757	3815	3873	3932	47
14	3322	3374	3427	3480	3535	3589	3645	3701	3758	3816	3874	3933	46
15	1.3323	1.3375	1.3428	1.3481	1.3535	1.3590	1.3646	1.3702	1.3759	1.3817	1.3875	1.3934	45
16	3324	3376	3429	3482	3536	3591	3647	3703	3760	3818	3876	3935	44
17	3325	3377	3430	3483	3537	3592	3648	3704	3761	3819	3877	3936	43
18	3325	3378	3431	3484	3538	3593	3649	3705	3762	3819	3878	3937	42
19	3326	3379	3431	3485	3539	3594	3649	3706	3763	3820	3879	3938	41
20	1.3327	1.3379	1.3432	1.3486	1.3540	1.3595	1.3650	1.3707	1.3764	1.3821	1.3880	1.3939	40
21	3328	3380	3433	3487	3541	3596	3651	3708	3765	3822	3881	3940	39
22	3329	3381	3434	3488	3542	3597	3652	3709	3766	3823	3882	3941	38
23	3330	3382	3435	3488	3543	3598	3653	3709	3767	3824	3883	3942	37
24	3331	3383	3436	3489	3544	3598	3654	3710	3768	3825	3884	3943	36
25	1.3332	1.3384	1.3437	1.3490	1.3545	1.3599	1.3655	1.3711	1.3768	1.3826	1.3885	1.3944	35
26	3332	3385	3438	3491	3545	3600	3656	3712	3769	3827	3886	3945	34
27	3333	3386	3438	3492	3546	3601	3657	3713	3770	3828	3887	3946	33
28	3334	3386	3439	3493	3547	3602	3658	3714	3771	3829	3888	3947	32
29	3335	3387	3440	3494	3548	3603	3659	3715	3772	3830	3889	3948	31
30	1.3336	1.3388	1.3441	1.3495	1.3549	1.3604	1.3660	1.3716	1.3773	1.3831	1.3890	1.3949	30
31	3337	3389	3442	3496	3550	3605	3661	3717	3776	3832	3891	3950	29
32	3338	3390	3443	3497	3551	3606	3662	3718	3775	3833	3892	3951	28
33	3338	3391	3444	3498	3552	3607	3663	3719	3776	3834	3893	3952	27
34	3339	3392	3445	3499	3553	3608	3663	3720	3777	3835	3894	3953	26
35	1.3340	1.3393	1.3446	1.3500	1.3554	1.3609	1.3664	1.3721	1.3778	1.3836	1.3895	1.3954	25
36	3341	3393	3446	3501	3555	3610	3665	3722	3779	3837	3896	3955	24
37	3342	3394	3447	3502	3555	3610	3666	3723	3780	3838	3897	3956	23
38	3343	3395	3448	3503	3556	3611	3667	3724	3781	3839	3898	3957	22
39	3344	3396	3449	3504	3557	3612	3668	3725	3782	3840	3899	3958	21
40	1.3345	1.3397	1.3450	1.3505	1.3558	1.3613	1.3669	1.3726	1.3783	1.3841	1.3900	1.3959	20
41	3345	3398	3451	3506	3559	3614	3670	3727	3784	3842	3901	3960	19
42	3346	3399	3452	3506	3560	3615	3671	3727	3785	3843	3902	3961	18
43	3347	3400	3453	3507	3561	3616	3672	3728	3786	3844	3903	3962	17
44	3348	3400	3454	3508	3562	3617	3673	3729	3787	3845	3904	3963	16
45	1.3349	1.3401	1.3454	1.3509	1.3563	1.3618	1.3674	1.3730	1.3788	1.3846	1.3905	1.3964	15
46	3350	3402	3455	3510	3564	3619	3675	3731	3789	3847	3906	3965	14
47	3351	3403	3456	3511	3565	3620	3676	3732	3790	3848	3907	3966	13
48	3351	3404	3457	3512	3565	3621	3677	3733	3791	3849	3908	3967	12
49	3352	3405	3458	3513	3566	3622	3677	3734	3792	3850	3909	3968	11
50	1.3353	1.3406	1.3459	1.3513	1.3567	1.3623	1.3678	1.3735	1.3793	1.3851	1.3910	1.3969	10
51	3354	3407	3460	3514	3568	3623	3679	3736	3793	3852	3911	3970	9
52	3355	3408	3461	3515	3569	3624	3680	3737	3794	3853	3912	3971	8
53	3356	3408	3462	3516	3570	3625	3681	3738	3795	3854	3913	3972	7
54	3357	3409	3463	3516	3571	3626	3682	3739	3796	3855	3914	3973	6
55	1.3358	1.3410	1.3463	1.3517	1.3572	1.3627	1.3683	1.3740	1.3797	1.3856	1.3915	1.3974	5
56	3358	3411	3464	3518	3573	3628	3684	3741	3798	3856	3916	3975	4
57	3359	3412	3465	3519	3574	3629	3685	3742	3799	3857	3917	3976	3
58	3360	3413	3466	3520	3575	3630	3686	3743	3800	3858	3918	3977	2
59	3361	3414	3467	3521	3576	3631	3687	3744	3801	3859	3919	3978	1
60	3362	3415	3468	3522	3576	3632	3688	3745	3802	3860	3919	3979	0
	23′	22′	21′	20′	19′	18′	17′	16′	15′	14′	13′	12′	S.

6 DEGREES.

When the Apparent Distance is *less* than 90°, the Second Correction is to be taken from the Bottom

TABLE XVII.

LOGARITHMS of the FIRST and SECOND CORRECTIONS.

The First Correction is *always* to be taken from the Top, and also the Second, when the Apparent Distance is *greater* than 90°.

3 DEGREES.

S.	48′	49′	50′	51′	52′	53′	54′	55′	56′	57′	58′	59′	
0	1.3979	1.4040	1.4102	1.4164	1.4228	1.4292	1.4357	1.4424	1.4491	1.4559	1.4629	1.4699	60
1	3980	4041	4103	4165	4229	4293	4358	4425	4492	4560	4630	4701	59
2	3981	4042	4104	4166	4230	4294	4359	4426	4493	4562	4631	4702	58
3	3982	4043	4105	4167	4231	4295	4361	4427	4494	4563	4632	4703	57
4	3983	4044	4106	4168	4232	4296	4362	4428	4495	4564	4633	4704	56
5	1.3984	1.4045	1.4107	1.4169	1.4233	1.4297	1.4363	1.4429	1.4497	1.4565	1.4635	1.4705	55
6	3985	4046	4108	4171	4234	4298	4364	4430	4198	4566	4636	4707	54
7	3986	4047	4109	4172	4235	4300	4365	4431	4499	4567	4637	4708	53
8	3987	4048	4110	4173	4236	4301	4366	4433	4500	4569	4638	4709	52
9	3988	4049	4111	4174	4237	4302	4367	4434	4501	4570	4639	4710	51
10	1.3989	1.4050	1.4112	1.4175	1.4238	1.4303	1.4368	1.4435	1.4502	1.4571	1.4640	1.4711	50
11	3990	4051	4113	4176	4239	.4304	4369	4436	4503	4572	4642	4712	49
12	3991	4052	4114	4177	4240	4305	4370	4437	4504	4573	4643	4714	48
13	3992	4053	4115	4178	4241	4306	4372	4438	4506	4574	4644	4715	47
14	3993	4054	4116	4179	4243	4307	4373	4439	4507	4575	4645	4716	46
15	1.3995	1·4055	1.4117	1.4180	1.4244	1.4308	1.4374	1.4440	1.4508	1.4577	1.4646	1.4717	45
16	3996	4056	4118	4181	4245	4309	4375	4441	4509	4578	4648	4718	44
17	3997	4058	4119	4182	4246	4310	4376	4443	4510	4579	4649	4720	43
18	3998	4059	4120	4183	4247	4311	4377	4444	4511	4580	4650	4721	42
19	3999	4060	4121	4184	4248	4313	4378	4445	4512	4581	4651	4722	41
20	1.4000	1.4061	1.4122	1.4185	1.4249	1.4314	1.4379	1.4446	1.4514	1.4582	1.4652	1.4723	40
21	4001	4062	4124	4186	4250	4315	4380	4447	4515	4584	4653	4724	39
22	4002	4063	4125	4187	4251	4316	4381	4448	4516	4585	4655	4726	38
23	4003	4064	4126	4188	4252	4317	4383	4449	4517	4586	4656	4727	37
24	4004	4065	4127	4189	4253	4318	4384	4450	4518	4587	4657	4728	36
25	1.4005	1.4066	1.4128	1.4191	1.4254	1.4319	1.4385	1.4452	1.4519	1.4588	1.4658	1.4729	35
26	4006	4067	4129	4192	4255	4320	4386	4453	4520	4589	4659	4730	34
27	4007	4068	4130	4193	4256	4321	4387	4454	4522	4590	4660	4732	33
28	4008	4069	4131	4194	4258	4322	4388	4455	4523	4592	4662	4733	32
29	4009	4070	4132	4195	4259	4323	4389	4456	4524	4593	4663	4734	31
30	1.4010	1.4071	1.4133	1.4196	1.4260	1.4325	1.4390	1.4457	1.4525	1.4594	1.4664	1.4735	30
31	4011	4072	4134	4197	4261	4326	4391	4458	4526	4595	4665	4736	29
32	4012	4073	4135	4198	4262	4327	4393	4459	4527	4596	4666	4737	28
33	4013	4074	4136	4199	4263	4328	4394	4460	4528	4597	4668	4739	27
34	4014	4075	4137	4200	4264	4329	4395	4462	4530	4599	4669	4740	26
35	1.4015	1.4076	1.4138	1.4201	1.4265	1.4330	1.4396	1.4463	1.4531	1.4600	1.4670	1.4741	25
36	4016	4077	4139	4202	4266	4331	4397	4464	4532	4601	4671	4742	24
37	4017	4078	4140	4203	4267	4332	4398	4465	4533	4602	4672	4744	23
38	4018	4079	4141	4204	4268	4333	4399	4466	4534	4603	4673	4745	22
39	4019	4080	4142	4205	4269	4334	4400	4467	4535	4604	4675	4746	21
40	1.4020	1.4081	1.4143	1.4206	1.4270	1.4335	1.4401	1.4468	1.4536	1.4606	1.4676	1.4747	20
41	4021	4082	4144	4207	4271	4336	4402	4469	4538	4607	4677	4748	19
42	4022	4083	4145	4209	4273	4338	4404	4471	4539	4608	4678	4750	18
43	4023	4084	4146	4210	4274	4339	4405	4472	4540	4609	4679	4751	17
44	4024	4085	4147	4211	4275	4340	4406	4473	4541	4610	4680	4752	16
45	1.4025	1.4086	1.4149	1.4212	1.4276	1.4341	1.4407	1.4474	1.4542	1.4611	1.4682	1.4753	15
46	4026	4087	4150	4213	4277	4342	4408	4475	4543	4612	4683	4754	14
47	4027	4088	4151	4214	4278	4343	4409	4476	4544	4614	4684	4756	13
48	4028	4089	4152	4215	4279	4344	4410	4477	4546	4615	4685	4757	12
49	4029	4090	4153	4216	4280	4345	4411	4479	4547	4616	4686	4758	11
50	1.4030	1.4091	1.4154	1.4217	1.4281	1.4346	1.4412	1.4480	1.4548	1.4617	1.4688	1.4759	10
51	4031	4092	4155	4218	4282	4347	4414	4481	4549	4618	4689	4760	9
52	4032	4093	4156	4219	4283	4349	4415	4482	4550	4619	4690	4762	8
53	4033	4095	4157	4220	4284	4350	4416	4483	4551	4621	4691	4763	7
54	4034	4096	4158	4221	4285	4351	4417	4484	4552	4622	4692	4764	6
55	1.4035	1.4097	1.4159	1.4222	1.4287	1.4352	1.4418	1.4485	1.4554	1.4623	1.4693	1.4765	5
56	4036	4098	4160	4223	4288	4353	4419	4486	4555	4624	4695	4766	4
57	4037	4099	4161	4224	4289	4354	4420	4488	4556	4625	4696	4768	3
58	4038	4100	4162	4226	4290	4355	4421	4489	4557	4626	4697	4769	2
59	4039	4101	4163	4227	4291	4356	4422	4490	4558	4628	4698	4770	1
60	4040	4102	4164	4228	4292	4357	4424	4491	4559	4629	4699	4771	0
	11′	10′	9′	8′	7′	6′	5′	4′	3′	2′	1′	0′	S.

6 DEGREES.

When the Apparent Distance is *less* than 90°, the Second Correction is to be taken from the Bottom.

TABLE XVII.

LOGARITHMS of the FIRST and SECOND CORRECTIONS.

The First Correction is *always* to be taken from the Top, and also the Second, when the Apparent Distance is *greater* than 90°.

4 DEGREES.

S.	0′	1′	2′	3′	4′	5′	6′	7′	8′	9′	10′	11′	
0	1.4771	1.4844	1.4918	1.4994	1.5071	1.5149	1.5229	1.5310	1.5393	1.5477	1.5563	1.5651	60
1	4772	4845	4920	4995	5072	5150	5230	5311	5394	5478	5564	5652	59
2	4774	4847	4921	4997	5073	5152	5231	5313	5395	5480	5566	5654	58
3	4775	4848	4922	4998	5075	5153	5233	5314	5397	5481	5567	5655	57
4	4776	4849	4923	4999	5076	5154	5234	5315	5398	5483	5569	5657	56
5	1.4777	1.4850	1.4925	1.5000	1.5077	1.5156	1.5235	1.5317	1.5400	1.5484	1.5570	1.5658	55
6	4778	4852	4926	5002	5079	5157	5237	5318	5401	5486	5572	5660	54
7	4780	4853	4927	5003	5080	5158	5238	5320	5402	5487	5573	5661	53
8	4781	4854	4928	5004	5081	5160	5240	5321	5404	5488	5575	5663	52
9	4782	4855	4930	5005	5082	5161	5241	5322	5405	5490	5576	5664	51
10	1.4783	1.4856	1.4931	1.5006	1.5084	1.5162	1.5242	1.5324	1.5407	1.5491	1.5578	1.5666	50
11	4785	4858	4932	5008	5085	5164	5244	5325	5408	5493	5579	5667	49
12	4786	4859	4933	5009	5086	5165	5245	5326	5409	5494	5580	5669	48
13	4787	4860	4935	5011	5088	5166	5246	5328	5411	5496	5582	5670	47
14	4788	4861	4936	5012	5089	5168	5248	5329	5412	5497	5583	5671	46
15	1.4789	1.4863	1.4937	1.5013	1.5090	1.5169	1.5249	1.5331	1.5414	1.5498	1.5585	1.5673	45
16	4791	4864	4938	5014	5092	5170	5250	5332	5415	5500	5586	5674	44
17	4792	4865	4940	5016	5093	5172	5252	5333	5416	5501	5588	5676	43
18	4793	4866	4941	5017	5094	5173	5253	5335	5418	5503	5589	5677	42
19	4794	4868	4942	5018	5095	5174	5254	5336	5419	5504	5591	5679	41
20	1.4795	1.4869	1.4943	1.5019	1.5097	1.5175	1.5256	1.5337	1.5421	1.5506	1.5592	1.5680	40
21	4797	4870	4945	5021	5098	5177	5257	5339	5422	5507	5594	5682	39
22	4798	4871	4946	5022	5099	5178	5258	5340	5423	5508	5595	5683	38
23	4799	4873	4947	5023	5101	5179	5260	5341	5425	5510	5596	5685	37
24	4800	4874	4949	5025	5102	5181	5261	5343	5426	5511	5598	5686	36
25	1.4801	1.4875	1.4950	1.5026	1.5103	1.5182	1.5262	1.5344	1.5428	1.5513	1.5599	1.5688	35
26	4803	4876	4951	5027	5105	5183	5264	5346	5429	5514	5601	5689	34
27	4804	4877	4952	5028	5106	5185	5265	5347	5430	5516	5602	5691	33
28	4805	4879	4954	5030	5107	5186	5266	5348	5432	5517	5604	5692	32
29	4806	4880	4955	5031	5108	5187	5268	5350	5433	5518	5605	5694	31
30	1.4808	1.4881	1.4956	1.5032	1.5110	1.5189	1.5269	1.5351	1.5435	1.5520	1.5607	1.5695	30
31	4809	4882	4957	5034	5111	5190	5271	5353	5436	5521	5608	5697	29
32	4810	4884	4959	5035	5112	5191	5272	5354	5437	5522	5610	5698	28
33	4811	4885	4960	5036	5114	5193	5273	5355	5439	5524	5611	5700	27
34	4812	4886	4961	5037	5115	5194	5275	5357	5440	5526	5613	5701	26
35	1.4814	1.4887	1.4962	1.5039	1.5116	1.5195	1.5276	1.5358	1.5442	1.5527	1.5614	1.5703	25
36	4815	4889	4964	5040	5118	5197	5277	5359	5443	5528	5615	5704	24
37	4816	4890	4965	5041	5119	5198	5279	5361	5445	5530	5617	5706	23
38	4817	4891	4966	5043	5120	5199	5280	5362	5446	5531	5618	5707	22
39	4819	4892	4967	5044	5122	5200	5281	5364	5447	5533	5620	5709	21
40	1.4820	1.4894	1.4969	1.5045	1.5123	1.5202	1.5283	1.5365	1.5449	1.5534	1.5621	1.5710	20
41	4821	4895	4970	5046	5124	5203	5284	5366	5450	5536	5623	5712	19
42	4822	4896	4971	5048	5125	5205	5285	5368	5452	5537	5624	5713	18
43	4823	4897	4972	5049	5127	5206	5287	5369	5453	5538	5626	5715	17
44	4825	4899	4974	5050	5128	5207	5288	5370	5454	5540	5627	5716	16
45	1.4826	1.4900	1.4975	1.5051	1.5129	1.5209	1.5290	1.5372	1.5456	1.5541	1.5629	1.5718	15
46	4827	4901	4976	5053	5131	5210	5291	5373	5457	5543	5630	5719	14
47	4828	4902	4977	5054	5132	5211	5292	5375	5459	5544	5632	5721	13
48	4830	4903	4979	5055	5133	5213	5294	5376	5460	5546	5633	5722	12
49	4831	4905	4980	5057	5135	5214	5295	5377	5461	5547	5635	5724	11
50	1.4832	1.4906	1.4981	1.5058	1.5136	1.5215	1.5296	1.5379	1.5463	1.5549	1.5636	1.5725	10
51	4833	4907	4983	5059	5137	5217	5298	5380	5464	5550	5637	5727	9
52	4834	4908	4984	5061	5139	5218	5299	5382	5466	5551	5639	5728	8
53	4836	4910	4985	5062	5140	5219	5300	5383	5467	5553	5640	5730	7
54	4837	4911	4986	5063	5141	5221	5302	5384	5469	5554	5642	5731	6
55	1.4838	1.4912	1.4988	1.5064	1.5143	1.5222	1.5303	1.5386	1.5470	1.5556	1.5643	1.5733	5
56	4839	4913	4989	5066	5144	5223	5305	5387	5471	5557	5645	5734	4
57	4841	4915	4990	5067	5145	5225	5306	5389	5473	5559	5646	5736	3
58	4842	4916	4991	5068	5146	5226	5307	5390	5474	5560	5648	5737	2
59	4843	4917	4992	5070	5148	5227	5309	5391	5476	5562	5649	5739	1
60	4844	4918	4994	5071	5149	5229	5310	5393	5477	5563	5651	5740	0
	59′	58′	57′	56′	55′	54′	53′	52′	51′	50′	49′	48′	S.

5 DEGREES.

When the Apparent Distance is *less* than 90°, the Second Correction is to be taken from the Bottom

TABLE XVII.

LOGARITHMS of the FIRST and SECOND CORRECTIONS.

The First Correction is *always* to be taken from the Top, and also the Second, when the Apparent Distance is *greater* than 90°.

	4 DEGREES.												
S.	12′	13′	14′	15′	16′	17′	18′	19′	20′	21′	22′	23′	
0	1.5740	1.5832	1.5925	1.6021	1.6118	1.6218	1.6320	1.6425	1.6532	1.6642	1.6755	1.6871	60
1	5742	5833	5927	6022	6120	6220	6322	6427	6534	6644	6757	6873	59
2	5743	5835	5928	6024	6121	6221	6324	6428	6536	6646	6759	6875	58
3	5745	5836	5930	6025	6123	6223	6325	6430	6538	6648	6761	6877	57
4	5746	5838	5931	6027	6125	6225	6327	6432	6539	6650	6763	6879	56
5	1.5748	1.5839	1.5933	1.6029	1.6126	1.6226	1.6329	1.6434	1.6541	1.6651	1.6764	1.6881	55
6	5749	5841	5935	6030	6128	6228	6331	6435	6543	6653	6766	6882	54
7	5751	5843	5936	6032	6130	6230	6332	6437	6545	6655	6768	6884	53
8	5752	5844	5938	6033	6131	6232	6334	6439	6547	6657	6770	6886	52
9	5754	5846	5939	6035	6133	6233	6336	6441	6548	6659	6772	6888	51
10	1.5755	1.5847	1.5941	1.6037	1.6135	1.6235	1.6338	1.6443	1.6550	1.6661	1.6774	1.6890	50
11	5757	5849	5942	6038	6136	6237	6339	6444	6552	6663	6776	6892	49
12	5758	5850	5944	6040	6138	6238	6341	6446	6554	6664	6778	6894	48
13	5760	5852	5946	6042	6140	6240	6343	6448	6556	6666	6780	6896	47
14	5761	5853	5947	6043	6141	6242	6344	6450	6558	6668	6782	6898	46
15	1.5763	1.5855	1.5949	1.6045	1.6143	1.6243	1.6346	1.6451	1.6559	1.6670	1.6784	1.6900	45
16	5765	5856	5950	6046	6145	6245	6348	6453	6561	6672	6785	6902	44
17	5766	5858	5952	6048	6146	6247	6350	6455	6563	6674	6787	6904	43
18	5768	5860	5954	6050	6148	6248	6351	6457	6565	6676	6789	6906	42
19	5769	5861	5955	6051	6150	6250	6353	6459	6567	6677	6791	6908	41
20	1.5771	1.5863	1.5957	1.6053	1.6151	1.6252	1.6355	1.6460	1.6568	1.6679	1.6793	1.6910	40
21	5772	5864	5958	6055	6153	6254	6357	6462	6570	6681	6795	6912	39
22	5774	5866	5960	6056	6155	6255	6358	6464	6572	6683	6797	6914	38
23	5775	5867	5961	6058	6156	6257	6360	6466	6574	6685	6799	6916	37
24	5777	5869	5963	6059	6158	6259	6362	6467	6576	6687	6801	6918	36
25	1.5778	1.5870	1.5965	1.6061	1.6160	1.6260	1.6364	1.6469	1.6578	1.6689	1.6803	1.6920	35
26	5780	5872	5966	6063	6161	6262	6365	6471	6579	6691	6805	6922	34
27	5781	5874	5968	6064	6163	6264	6367	6473	6581	6692	6807	6924	33
28	5783	5875	5969	6066	6165	6265	6369	6475	6583	6694	6809	6926	32
29	5784	5877	5971	6067	6166	6267	6371	6476	6585	6696	6810	6928	31
30	1.5786	1.5878	1.5973	1.6069	1.6168	1.6269	1.6372	1.6478	1.6587	1.6698	1.6812	1.6930	30
31	5787	5880	5974	6071	6169	6271	6374	6480	6589	6700	6814	6932	29
32	5789	5881	5976	6072	6171	6272	6376	6482	6590	6702	6816	6934	28
33	5790	5883	5977	6074	6173	6274	6377	6484	6592	6704	6818	6936	27
34	5792	5884	5979	6076	6174	6276	6379	6485	6594	6706	6820	6938	26
35	1.5793	1.5886	1.5981	1.6077	1.6176	1.6277	1.6381	1.6487	1.6596	1.6708	1.6822	1.6940	25
36	5795	5888	5982	6079	6178	6279	6383	6489	6598	6709	6824	6942	24
37	5796	5889	5984	6081	6179	6281	6384	6491	6600	6711	6826	6944	23
38	5798	5891	5985	6082	6181	6282	6386	6492	6601	6713	6828	6946	22
39	5800	5892	5987	6084	6183	6284	6388	6494	6603	6715	6830	6948	21
40	1.5801	1.5894	1.5989	1.6085	1.6185	1.6286	1.6390	1.6496	1.6605	1.6717	1.6832	1.6950	20
41	5803	5895	5990	6087	6186	6288	6391	6498	6607	6719	6834	6952	19
42	5804	5897	5992	6089	6188	6289	6393	6500	6609	6721	6836	6954	18
43	5806	5898	5993	6090	6190	6291	6395	6501	6611	6723	6838	6956	17
44	5807	5900	5995	6092	6191	6293	6397	6503	6612	6725	6840	6958	16
45	1.5809	1.5902	1.5997	1.6094	1.6193	1.6294	1.6398	1.6505	1.6614	1.6726	1.6841	1.6960	15
46	5810	5903	5998	6095	6195	6296	6400	6507	6616	6728	6843	6962	14
47	5812	5905	6000	6097	6196	6298	6402	6509	6618	6730	6845	6964	13
48	5813	5906	6001	6099	6198	6300	6404	6510	6620	6732	6847	6966	12
49	5815	5908	6003	6100	6200	6301	6406	6512	6622	6734	6849	6968	11
50	1.5816	1.5909	1.6005	1.6102	1.6201	1.6303	1.6407	1.6514	1.6624	1.6736	1.6851	1.6970	10
51	5818	5911	6006	6103	6203	6305	6409	6516	6625	6738	6853	6972	9
52	5819	5913	6008	6105	6205	6306	6411	6518	6627	6740	6855	6974	8
53	5821	5914	6009	6107	6206	6308	6413	6519	6629	6742	6857	6976	7
54	5823	5916	6011	6108	6208	6310	6414	6521	6631	6743	6859	6978	6
55	1.5824	1.5917	1.6013	1.6110	1.6210	1.6312	1.6416	1.6523	1.6633	1.6745	1.6861	1.6980	5
56	5826	5919	6014	6112	6211	6313	6418	6525	6635	6747	6863	6982	4
57	5827	5920	6016	6113	6213	6315	6420	6527	6637	6749	6865	6984	3
58	5829	5922	6017	6115	6215	6317	6421	6529	6638	6751	6867	6986	2
59	5830	5924	6019	6117	6216	6319	6423	6530	6640	6753	6869	6988	1
60	5832	5925	6021	6118	6218	6320	6425	6532	6642	6755	6871	6990	0
	47′	46′	45′	44′	43′	42′	41′	40′	39′	38′	37′	36′	S.
	5 DEGREES.												

When the Apparent Distance is *less* than 90°, the Second Correction is to be taken from the Bottom

TABLE XVII.

LOGARITHMS of the FIRST and SECOND CORRECTIONS.

The First Correction is *always* to be taken from the Top, and also the Second, when the Apparent Distance is *greater* than 90°.

4 DEGREES.

S.	24′	25′	26′	27′	28′	29′	30′	31′	32′	33′	34′	35′	
0	1.6990	1.7112	1.7238	1.7368	1.7501	1.7639	1.7782	1.7929	1.8081	1.8239	1.8403	1.8573	60
1	6992	7114	7240	7370	7503	7641	7784	7931	8084	8242	8406	8576	59
2	6994	7116	7242	7372	7506	7644	7786	7934	8086	8244	8409	8579	58
3	6996	7118	7244	7374	7508	7646	7789	7936	8089	8247	8411	8582	57
4	6998	7120	7246	7376	7510	7648	7791	7939	8091	8250	8414	8585	56
5	1.7000	1.7122	1.7249	1.7379	1.7513	1.7651	1.7794	1.7941	1.8094	1.8253	1.8417	1.8588	55
6	7002	7124	7251	7381	7515	7653	7796	7944	8097	8255	8420	8591	54
7	7004	7127	7253	7383	7517	7655	7798	7946	8099	8258	8423	8594	53
8	7006	7129	7255	7385	7519	7658	7801	7949	8102	8261	8425	8597	52
9	7008	7131	7257	7387	7522	7660	7803	7951	8104	8263	8428	8599	51
10	1.7010	1.7133	1.7259	1.7390	1.7524	1.7663	1.7806	1.7954	1.8107	1.8266	1.8431	1.8602	50
11	7012	7135	7261	7392	7526	7665	7808	7956	8110	8269	8434	8605	49
12	7014	7137	7264	7394	7528	7667	7811	7959	8112	8271	8437	8608	48
13	7016	7139	7266	7396	7531	7670	7813	7961	8115	8274	8439	8611	47
14	7018	7141	7268	7398	7533	7672	7815	7964	8117	8277	8442	8614	46
15	1.7020	1.7143	1.7270	1.7401	1.7535	1.7674	1.7818	1.7966	1.8120	1.8279	1.8445	1.8617	45
16	7022	7145	7272	7403	7538	7677	7820	7969	8123	8282	8448	8620	44
17	7024	7147	7274	7405	7540	7679	7823	7971	8125	8285	8451	8623	43
18	7026	7149	7276	7407	7542	7681	7825	7974	8128	8288	8153	8626	42
19	7028	7152	7279	7409	7544	7684	7828	7976	8131	8290	8456	8629	41
20	1.7030	1.7154	1.7281	1.7412	1.7547	1.7686	1.7830	1.7979	1.8133	1.8293	1.8459	1.8632	40
21	7032	7156	7283	7414	7549	7688	7832	7981	8136	8296	8462	8635	39
22	7034	7158	7285	7416	7551	7691	7835	7984	8138	8298	8465	8637	38
23	7036	7160	7287	7418	7554	7693	7837	7987	8141	8301	8467	8640	37
24	7038	7162	7289	7421	7556	7696	7840	7989	8144	8304	8470	8643	36
25	1.7040	1.7164	1.7291	1.7423	1.7558	1.7698	1.7842	1.7992	1.8146	1.8307	1.8473	1.8646	35
26	7042	7166	7294	7425	7560	7700	7845	7994	8149	8309	8476	8649	34
27	7044	7168	7296	7427	7563	7703	7847	7997	8152	8312	8479	8652	33
28	7046	7170	7298	7429	7565	7705	7850	7999	8154	8315	8482	8655	32
29	7048	7172	7300	7432	7567	7707	7852	8002	8157	8318	8484	8658	31
30	1.7050	1.7175	1.7302	1.7434	1.7570	1.7710	1.7855	1.8004	1.8159	1.8320	1.8487	1.8661	30
31	7052	7177	7304	7436	7572	7712	7857	8007	8162	8323	8490	8664	29
32	7055	7179	7307	7438	7574	7714	7859	8009	8165	8326	8493	8667	28
33	7057	7181	7309	7441	7576	7717	7862	8012	8167	8328	8496	8670	27
34	7059	7183	7311	7443	7579	7719	7864	8014	8170	8331	8499	8673	26
35	1.7061	1.7185	1.7313	1.7445	1.7581	1.7722	1.7867	1.8017	1.8173	1.8334	1.8502	1.8676	25
36	7063	7187	7315	7447	7583	7724	7869	8020	8175	8337	8504	8679	24
37	7065	7189	7317	7450	7586	7726	7872	8022	8178	8339	8507	8682	23
38	7067	7191	7320	7452	7588	7729	7874	8025	8181	8342	8510	8685	22
39	7069	7193	7322	7454	7590	7731	7877	8027	8183	8345	8513	8688	21
40	1.7071	1.7196	1.7324	1.7456	1.7593	1.7734	1.7879	1.8030	1.8186	1.8348	1.8516	1.8691	20
41	7073	7198	7326	7458	7595	7736	7882	8032	8188	8350	8519	8694	19
42	7075	7200	7328	7461	7597	7738	7884	8035	8191	8353	8522	8697	18
43	7077	7202	7330	7463	7600	7741	7887	8037	8194	8356	8524	8709	17
44	7079	7204	7333	7465	7602	7743	7889	8040	8196	8359	8527	8703	16
45	1.7081	1.7206	1.7335	1.7467	1.7604	1.7745	1.7891	1.8043	1.8199	1.8361	1.8530	1.8706	15
46	7083	7208	7337	7470	7607	7748	7894	8045	8202	8364	8533	8709	14
47	7085	7210	7339	7472	7609	7750	7896	8048	8204	8367	8536	8712	13
48	7087	7212	7341	7474	7611	7753	7899	8050	8207	8370	8539	8715	12
49	7089	7215	7344	7476	7613	7755	7901	8053	8210	8372	8542	8718	11
50	1.7091	1.7217	1.7346	1.7479	1.7616	1.7758	1.7904	1.8055	1.8212	1.8375	1.8544	1.8721	10
51	7093	7219	7348	7481	7618	7760	7906	8058	8215	8378	8547	8724	9
52	7096	7221	7350	7483	7620	7762	7909	8061	8218	8381	8550	8727	8
53	7098	7223	7352	7485	7623	7765	7911	8063	8220	8384	8553	8730	7
54	7100	7225	7354	7488	7625	7767	7914	8066	8223	8386	8556	8733	6
55	1.7102	1.7227	1.7357	1.7490	1.7627	1.7769	1.7916	1.8068	1.8226	1.8389	1.8559	1.8736	5
56	7104	7229	7359	7492	7630	7772	7919	8071	8228	8392	8562	8739	4
57	7106	7232	7361	7494	7632	7774	7921	8073	8231	8395	8565	8742	3
58	7108	7234	7363	7497	7634	7777	7924	8076	8234	8397	8568	8745	2
59	7110	7236	7365	7499	7637	7779	7926	8079	8236	8400	8570	8748	1
60	7112	7238	7368	7501	7639	7782	7929	8081	8239	8403	8573	8751	0
	35′	34′	33′	32′	31′	30′	29′	28′	27′	26′	25′	24′	S.

5 DEGREES.

When the Apparent Distance is *less* than 90°, the Second Correction is to be taken from the Bottom.

TABLE XVII.

LOGARITHMS of the FIRST and SECOND CORRECTIONS.

The First Correction is *always* to be taken from the Top, and also the Second, when the Apparent Distance is *greater* than 90°.

	4 DEGREES.												
S.	36′	37′	38′	39′	40′	41′	42′	43′	44′	45′	46′	47′	
0	1.8751	1.8935	1.9128	1.9331	1.9542	1.9765	2.0000	2.0248	2.0512	2.0792	2.1091	2.1413	60
1	8754	8939	9132	9334	9546	9769	0004	0252	0516	0797	1097	1419	59
2	8757	8942	9135	9337	9550	9773	0008	0257	0521	0801	1102	1424	58
3	8760	8945	9138	9341	9553	9777	0012	0261	0525	0806	1107	1430	57
4	8763	8948	9142	9344	9557	9780	0016	0265	0530	0811	1112	1436	56
5	1.8766	1.8951	1.9145	1.9348	1.9561	1.9784	2.0020	2.0270	2.0534	2.0816	2.1117	2.1441	55
6	8769	8954	9148	9351	9564	9788	0024	0274	0539	0821	1123	1447	54
7	8772	8958	9152	9355	9568	9792	0028	0278	0543	0826	1128	1452	53
8	8775	8961	9155	9358	9571	9796	0032	0282	0548	0831	1133	1458	52
9	8778	8964	9158	9362	9575	9800	0036	0287	0552	0835	1138	1464	51
10	1.8781	1.8967	1.9162	1.9365	1.9579	1.9803	2.0040	2.0291	2.0557	2.0840	2.1143	2.1469	50
11	8784	8970	9165	9369	9582	9807	0044	0205	0562	0845	1149	1475	49
12	8787	8973	9168	9372	9586	9811	0049	0300	0566	0850	1154	1481	48
13	8790	8977	9172	9376	9590	9815	0053	0304	0571	0855	1159	1486	47
14	8793	8980	9175	9379	9593	9819	0057	0308	0575	0860	1164	1492	46
15	1.8796	1.8983	1.9179	1.9383	1.9597	1.9823	2.0061	2.0313	2.0580	2.0865	2.1170	2.1498	45
16	8799	8986	9181	9386	9601	9827	0065	0317	0585	0870	1175	1503	44
17	8802	8989	9185	9390	9604	9830	0069	0321	0589	0875	1180	1509	43
18	8805	8992	9188	9393	9608	9834	0073	0326	0594	0880	1186	1515	42
19	8808	8996	9191	9397	9612	9838	0077	0330	0598	0884	1191	1520	41
20	1.8811	1.8999	1.9195	1.9400	1.9615	1.9842	2.0081	2.0334	2.0603	2.0889	2.1196	2.1526	40
21	8814	9002	9198	9404	9619	9846	0085	0339	0608	0894	1201	1532	39
22	8817	9005	9201	9407	9623	9850	0089	0343	0612	0899	1207	1538	38
23	8821	9008	9205	9411	9626	9854	0093	0347	0617	0904	1212	1543	37
24	8824	9012	9208	9414	9630	9858	0098	0352	0621	0909	1217	1549	36
25	1.8827	1.9015	1.9212	1.9418	1.9634	1.9861	2.0102	2.0356	2.0626	2.0914	2.1223	2.1555	35
26	8830	9018	9215	9421	9638	9865	0106	0360	0631	0919	1228	1561	34
27	8833	9021	9218	9425	9641	9869	0110	0365	0635	0924	1233	1566	33
28	8836	9024	9222	9428	9645	9873	0114	0369	0640	0929	1239	1572	32
29	8839	9028	9225	9432	9649	9877	0118	0374	0645	0934	1244	1578	31
30	1.8842	1.9031	1.9228	1.9435	1.9652	1.9881	2.0122	2.0378	2.0649	2.0939	2.1249	2.1584	30
31	8845	9034	9232	9439	9656	9885	0126	0382	0654	0944	1255	1589	29
32	8848	9037	9235	9442	9660	9889	0131	0387	0659	0949	1260	1595	28
33	8851	9041	9238	9446	9664	9893	0135	0391	0663	0954	1266	1601	27
34	8854	9044	9242	9449	9667	9897	0139	0395	0668	0959	1271	1607	26
35	1.8857	1.9047	1.9245	1.9453	1.9671	1.9901	2.0143	2.0400	2.0673	2.0964	2.1276	2.1613	25
36	8861	9050	9249	9456	9675	9905	0147	0404	0678	0969	1282	1619	24
37	8864	9053	9252	9460	9678	9908	0151	0409	0682	0974	1287	1624	23
38	8867	9057	9255	9464	9682	9912	0156	0413	0687	0979	1292	1630	22
39	8870	9060	9259	9467	9686	9916	0160	0418	0692	0984	1298	1636	21
40	1.8873	1.9063	1.9262	1.9471	1.9690	1.9920	2.0164	2.0422	2.0696	2.0989	2.1303	2.1642	20
41	8876	9066	9266	9474	9693	9924	0168	0426	0701	0994	1309	1648	19
42	8879	9070	9269	9478	9697	9928	0172	0431	0706	0999	1314	1654	18
43	8882	9073	9272	9481	9701	9932	0176	0435	0711	1004	1320	1660	17
44	8885	9076	9276	9485	9705	9936	0181	0440	0715	1009	1325	1665	16
45	1.8888	1.9079	1.9279	1.9488	1.9708	1.9940	2.0185	2.0444	2.0720	2.1015	2.1331	2.1671	15
46	8892	9083	9283	9492	9712	9944	0189	0449	0725	1020	1336	1677	14
47	8895	9086	9286	9496	9716	9948	0193	0453	0730	1025	1342	1683	13
48	8898	9089	9289	9499	9720	9952	0197	0458	0734	1030	1347	1689	12
49	8901	9092	9293	9503	9723	9956	0202	0462	0739	1035	1352	1695	11
50	1.8904	1.9096	1.9296	1.9506	1.9727	1.9960	2.0206	2.0467	2.0744	2.1040	2.1358	2.1701	10
51	8907	9099	9300	9510	9731	9964	0210	0471	0749	1045	1363	1707	9
52	8910	9102	9303	9514	9735	9968	0214	0475	0753	1050	1369	1713	8
53	8913	9106	9306	9517	9739	9972	0219	0480	0758	1055	1374	1719	7
54	8917	9109	9310	9521	9742	9976	0223	0484	0763	1061	1380	1725	6
55	1.8920	1.9112	1.9313	1.9524	1.9746	1.9980	2.0227	2.0489	2.0768	2.1065	2.1386	2.1731	5
56	8923	9115	9317	9528	9750	9984	0231	0493	0773	1071	1391	1737	4
57	8926	9119	9320	9532	9754	9988	0235	0498	0777	1076	1397	1743	3
58	8929	9122	9324	9535	9758	9992	0240	0502	0782	1081	1402	1749	2
59	8932	9125	9327	9539	9761	9996	0244	0507	0787	1086	1408	1755	1
60	8935	9128	9331	9542	9765	2.0000	0248	0512	0792	1091	1413	1761	0
	23′	22′	21′	20′	19′	18′	17′	16′	15′	14′	13′	12′	S.
	5 DEGREES.												

When the Apparent Distance is *less* than 90°, the Second Correction is to be taken from the Bottom.

TABLE XVII.

LOGARITHMS of the FIRST and SECOND CORRECTIONS.

The First Correction is *always* to be taken from the Top, and also the Second, when the Apparent Distance is *greater* than 90°.

	4 DEGREES.												
S.	48′	49′	50′	51′	52′	53′	54′	55′	56′	57′	58′	59′	S.
0	2.1761	2.2139	2.2553	2.3010	2.3522	2.4102	2.4771	2.5563	2.6532	2.7782	2.9542	3.2553	60
1	1767	2145	2560	3018	3531	4112	4783	5578	6550	7806	9579	2626	59
2	1773	2152	2567	3026	3540	4122	4795	5592	6568	7830	9615	2706	58
3	1779	2159	2574	3034	3549	4133	4808	5607	6587	7855	9652	2775	57
4	1785	2165	2582	3043	3558	4143	4820	5621	6605	7879	9690	2852	56
5	2.1791	2.2172	2.2589	2.3051	2.3567	2.4154	2.4832	2.5636	2.6624	2.7904	2.9727	3.2931	55
6	1797	2178	2596	3059	3576	4164	4844	5651	6642	7929	9765	3010	54
7	1803	2185	2604	3067	3586	4175	4856	5666	6661	7954	9803	3091	53
8	1809	2192	2611	3075	3595	4185	4869	5680	6679	7979	9842	3174	52
9	1816	2198	2618	3083	3604	4196	4881	5695	6698	8004	9881	3259	51
10	2.1822	2.2205	2.2626	2.3091	2.3613	2.4206	2.4894	2.5710	2.6717	2.8030	2.9920	3.3345	50
11	1828	2212	2633	3100	3623	4217	4906	5725	6736	8055	9960	3432	49
12	1834	2218	2640	3108	3632	4228	4918	5740	6755	8081	3.0000	3522	48
13	1840	2225	2648	3116	3641	4238	4931	5755	6774	8107	0040	3613	47
14	1846	2232	2655	3124	3650	4249	4943	5771	6793	8133	0081	3707	46
15	2.1852	2.2239	2.2663	2.3133	2.3660	2.4260	2.4956	2.5786	2.6812	2.8159	3.0122	3.3802	45
16	1859	2245	2670	3141	3669	4270	4969	5801	6832	8186	0164	3900	44
17	1865	2252	2678	3149	3678	4281	4981	5816	6851	8212	0206	4000	43
18	1871	2259	2685	3158	3688	4292	4994	5832	6871	8239	0248	4102	42
19	1877	2266	2692	3166	3697	4303	5007	5847	6890	8266	0291	4206	41
20	2.1883	2.2272	2.2700	2.3174	2.3707	2.4314	2.5019	2.5863	2.6910	2.8293	3.0334	3.4314	40
21	1889	2279	2707	3183	3716	4325	5032	5878	6930	8320	0378	4424	39
22	1896	2286	2715	3191	3726	4335	5045	5894	6950	8348	0422	4536	38
23	1902	2293	2722	3199	3735	4346	5058	5909	6970	8375	0467	4652	37
24	1908	2300	2730	3208	3745	4357	5071	5925	6990	8403	0512	4771	36
25	2.1914	2.2307	2.2738	2.3216	2.3754	2.4368	2.5084	2.5941	2.7010	2.8431	3.0557	3.4894	35
26	1921	2313	2745	3225	3764	4379	5097	5957	7030	8459	0603	5019	34
27	1927	2320	2753	3233	3773	4390	5110	5973	7050	8487	0649	5149	33
28	1933	2327	2760	3242	3783	4401	5123	5989	7071	8516	0696	5283	32
29	1939	2334	2768	3250	3792	4412	5136	6005	7091	8544	0744	5421	31
30	2.1946	2.2341	2.2775	2.3259	2.3802	2.4424	2.5149	2.6021	2.7112	2.8573	3.0792	3.5563	30
31	1952	2348	2783	3267	3812	4435	5162	6037	7133	8602	0840	5710	29
32	1958	2355	2791	3276	3821	4446	5175	6053	7154	8632	0889	5863	28
33	1965	2362	2798	3284	3831	4457	5189	6069	7175	8661	0939	6021	27
34	1971	2368	2806	3293	3841	4468	5202	6085	7196	8691	0989	6185	26
35	2.1977	2.2375	2.2814	2.3301	2.3851	2.4480	2.5215	2.6102	2.7217	2.8721	3.1040	3.6355	25
36	1984	2382	2821	3310	3860	4491	5229	6118	7238	8751	1091	6532	24
37	1990	2389	2829	3319	3870	4502	5242	6135	7259	8781	1143	6717	23
38	1996	2396	2837	3327	3880	4514	5256	6151	7281	8811	1196	6910	22
39	2003	2403	2845	3336	3890	4525	5269	6168	7302	8842	1249	7112	21
40	2.2009	2.2410	2.2852	2.3345	2.3900	2.4536	2.5283	2.6185	2.7324	2.8873	3.1303	3.7324	20
41	2016	2417	2860	3353	3910	4548	5296	6201	7346	8904	1358	7547	19
42	2022	2424	2868	3362	3919	4559	5310	6218	7368	8935	1413	7782	18
43	2028	2431	2876	3371	3929	4571	5324	6235	7390	8967	1469	8030	17
44	2035	2438	2883	3379	3939	4582	5337	6252	7412	8999	1526	8293	16
45	2.2041	2.2445	2.2891	2.3388	2.3949	2.4594	2.5351	2.6269	2.7434	2.9031	3.1584	3.8573	15
46	2048	2453	2899	3397	3959	4606	5365	6286	7456	9063	1642	8873	14
47	2054	2460	2907	3406	3969	4617	5379	6303	7479	9096	1701	9195	13
48	2061	2467	2915	3415	3979	4629	5393	6320	7501	9128	1761	9542	12
49	2067	2174	2923	3423	3989	4640	5407	6338	7524	9162	1822	9929	11
50	2.2073	2.2481	2.2931	2.3432	2.4000	2.4652	2.5421	2.6355	2.7547	2.9195	3.1883	4.0334	10
51	2080	2488	2939	3441	4010	4664	5435	6372	7570	9228	1946	0792	9
52	2086	2495	2946	3450	4020	4676	5449	6390	7593	9262	2009	1303	8
53	2093	2502	2954	3459	4030	4688	5463	6407	7616	9296	2073	1983	7
54	2099	2510	2962	3468	4940	4699	5477	6425	7639	9331	2139	2553	6
55	2.2106	2.2517	2.2970	2.3477	2.4050	2.4711	2.5491	2.6443	2.7663	2.9365	3.2205	4.3345	5
56	2113	2524	2978	3186	4061	4723	5506	6460	7686	9400	2272	4314	4
57	2119	2531	2986	3495	4071	4735	5520	6478	7710	9435	2341	5563	3
58	2126	2538	2994	3504	4081	4747	5534	6496	7734	9471	2410	7321	2
59	2132	2545	3002	3513	4091	4759	5549	6514	7757	9506	2481	5.0334	1
60	2139	2553	3010	3522	4102	4771	5563	6532	7782	9542	2553		0
	11′	10′	9′	8′	7′	6′	5′	4′	3′	2′	1′	0′	S.
	5 DEGREES.												

When the Apparent Distance is *less* than 90°, the Second Correction is to be taken from the Bottom.

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 20°.

D's App Alt.	APPARENT ALTITUDE OF THE SUN, OR A STAR.																D's App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	1 38	1 42	1 46	1 55	2 7	2 19	2 34	3 9	3 43	4 17	4 51	5 25	5 59	6 32			6
7	1 46	1 37	1 40	1 46	1 53	2 3	2 12	2 36	3 1	3 29	3 57	4 24	4 50	5 16			7
8	1 55	1 43	1 36	1 40	1 44	1 49	1 56	2 14	2 35	2 56	3 17	3 39	4 0	4 21	4 42		8
9	2 8	1 51	1 40	1 36	1 39	1 42	1 45	1 57	2 12	2 29	2 47	3 5	3 23	3 41	3 58		9
10	2 23	2 0	1 46	1 40	1 36	1 37	1 39	1 46	1 56	2 10	2 24	2 38	2 53	3 8	3 23	3 37	10
11	2 38	2 11	1 54	1 45	1 38	1 35	1 37	1 40	1 46	1 56	2 8	2 20	2 32	2 44	2 56	3 7	11
12	2 53	2 23	2 3	1 51	1 41	1 37	1 35	1 37	1 41	1 47	1 56	2 6	2 16	2 26	2 35	2 44	12
13	3 9	2 35	2 13	1 57	1 46	1 40	1 37	1 35	1 37	1 41	1 48	1 56	2 4	2 12	2 19	2 26	13
14	3 25	2 47	2 23	2 3	1 52	1 44	1 39	1 33	1 34	1 37	1 42	1 48	1 54	2 0	2 5	2 11	14
15	3 41	3 0	2 34	2 11	1 58	1 49	1 42	1 35	1 33	1 35	1 38	1 41	1 45	1 50	1 54	1 59	15
16	3 58	3 13	2 45	2 20	2 4	1 54	1 46	1 36	1 32	1 33	1 34	1 36	1 38	1 42	1 46	1 50	16
17	4 15	3 26	2 56	2 29	2 10	1 59	1 50	1 38	1 33	1 31	1 32	1 33	1 34	1 36	1 39	1 42	17
18	4 32	3 40	3 7	2 38	2 17	2 4	1 54	1 40	1 34	1 30	1 30	1 30	1 31	1 32	1 34	1 36	18
19	4 49	3 53	3 18	2 47	2 24	2 9	1 58	1 43	1 35	1 31	1 29	1 29	1 29	1 30	1 32	1 33	19
20	5 5	4 6	3 28	2 56	2 31	2 15	2 2	1 46	1 37	1 31	1 28	1 28	1 28	1 29	1 30	1 30	20
21	5 21	4 19	3 39	3 4	2 38	2 20	2 6	1 49	1 39	1 32	1 29	1 27	1 27	1 27	1 27	1 27	21
22	5 36	4 32	3 49	3 12	2 46	2 26	2 11	1 53	1 40	1 33	1 29	1 26	1 25	1 25	1 25	1 25	22
23	5 51	4 44	3 59	3 20	2 53	2 32	2 16	1 57	1 42	1 34	1 29	1 26	1 25	1 24	1 24	1 23	23
24	6 5	4 56	4 9	3 28	3 0	2 38	2 22	2 0	1 43	1 35	1 30	1 26	1 24	1 24	1 23	1 22	24
25	6 19	5 7	4 18	3 36	3 7	2 44	2 26	2 3	1 45	1 36	1 30	1 26	1 24	1 23	1 21	1 20	25
26	6 32	5 18	4 27	3 44	3 14	2 49	2 31	2 6	1 47	1 37	1 31	1 27	1 25	1 23	1 21	1 19	26
27	6 45	5 29	4 35	3 52	3 20	2 54	2 35	2 8	1 49	1 38	1 32	1 28	1 25	1 23	1 21	1 19	27
28		5 39	4 42	3 59	3 26	2 59	2 38	2 11	1 50	1 39	1 33	1 28	1 25	1 23	1 21	1 19	28
29			4 49	4 6	3 32	3 4	2 41	2 13	1 52	1 40	1 33	1 28	1 25	1 23	1 21	1 19	29
30				4 12	3 37	3 8	2 45	2 15	1 54	1 41	1 34	1 28	1 25	1 23	1 21	1 19	30
31					3 42	3 12	2 49	2 16	1 56	1 42	1 34	1 28	1 25	1 22	1 20	1 18	31
32						3 16	2 52	2 18	1 58	1 43	1 34	1 28	1 24	1 21	1 19	1 18	32
33							2 55	2 20	1 59	1 43	1 33	1 27	1 24	1 21	1 19	1 17	33
34								2 21	1 59	1 43	1 33	1 26	1 23	1 20	1 18	1 16	34
35								2 22	1 59	1 43	1 32	1 25	1 22	1 19	1 17	1 15	35
36									1 59	1 42	1 31	1 24	1 20	1 17	1 15	1 14	36
37									1 59	1 42	1 30	1 23	1 19	1 16	1 14	1 13	37
38										1 41	1 29	1 22	1 18	1 15	1 13	1 12	38
39										1 41	1 28	1 21	1 17	1 13	1 11	1 11	39
40											1 27	1 20	1 15	1 12	1 10	1 10	40
41											1 26	1 18	1 13	1 10	1 9	1 8	41
42												1 17	1 11	1 8	1 7	1 7	42
43												1 16	1 10	1 6	1 5	1 5	43
44													1 9	1 4	1 3	1 3	44
46													1 7	1 2	1 0	1 0	46
48														59	56	56	48
50															52	50	50
52																45	52
54																	54
56																	56
58																	58
60																	60
62																	62
64																	64
66																	66
68																	68
70																	70
72																	72
74																	74
76																	76
78																	78
80																	80
82																	82
84																	84
86																	86
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 20°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6																	6
7																	7
8																	8
9																	9
10																	10
11	3 16																11
12	2 52																12
13	2 32	2 38															13
14	2 16	2 21															14
15	2 3	2 7	2 13														15
16	1 53	1 56	1 59														16
17	1 44	1 46	1 47	1 51													17
18	1 37	1 39	1 40	1 41													18
19	1 33	1 34	1 34	1 34													19
20	1 30	1 30	1 29	1 28	1 26												20
21	1 27	1 26	1 25	1 23	1 21												21
22	1 24	1 23	1 22	1 20	1 18												22
23	1 22	1 21	1 20	1 18	1 15												23
24	1 21	1 20	1 18	1 16	1 12	1 8											24
25	1 19	1 18	1 16	1 14	1 9	1 4											25
26	1 17	1 16	1 14	1 12	1 7	1 1											26
27	1 17	1 15	1 13	1 11	1 6	1 0											27
28	1 17	1 15	1 13	1 10	1 4	57	50										28
29	1 17	1 16	1 14	1 11	1 5	58	50										29
30	1 18	1 17	1 15	1 12	1 7	59	50										30
31	1 17	1 16	1 15	1 12	1 7	59	51										31
32	1 17	1 16	1 14	1 12	1 7	59	51	42									32
33	1 16	1 15	1 13	1 12	1 8	1 1	52	43									33
34	1 15	1 14	1 13	1 11	1 8	1 1	53	43									34
35	1 14	1 13	1 12	1 11	1 8	1 1	53	44									35
36	1 13	1 12	1 11	1 10	1 7	1 1	54	45	36								36
37	1 12	1 11	1 10	1 9	1 6	1 1	54	46	37								37
38	1 11	1 10	1 9	1 8	1 6	1 1	55	47	38								38
39	1 10	1 10	1 9	1 8	1 5	1 1	55	47	39								39
40	1 9	1 9	1 8	1 6	1 4	1 0	55	48	39	32							40
41	1 8	1 8	1 7	1 5	1 3	1 0	55	48	39	32							41
42	1 7	1 7	1 6	1 4	1 2	59	55	48	40	33							42
43	1 5	1 5	1 5	1 4	1 2	59	55	48	40	33							43
44	1 4	1 4	1 4	1 3	1 1	59	55	48	40	34	29						44
46	1 1	1 2	1 2	1 1	1 0	58	54	48	41	35	30						46
48	56	58	59	59	58	56	53	49	43	37	31	25					48
50	52	54	55	56	55	54	51	48	43	38	33	27					50
52	48	49	50	51	51	51	49	47	43	39	35	29	24				52
54	44	43	45	46	47	48	47	45	43	40	36	30	25				54
56		38	40	42	44	45	45	44	42	40	35	31	27	22			56
58			35	38	40	42	43	42	40	38	34	31	27	23			58
60				34	36	39	41	41	39	36	33	29	26	23	21		60
62					33	36	38	39	38	35	32	29	26	24	22		62
64					30	33	35	37	37	35	32	29	27	25	22		64
66						30	32	35	36	34	31	29	27	25	23	21	66
68						27	29	32	34	32	30	28	26	25	23	21	68
70							27	30	32	31	29	27	26	24	22	20	70
72							25	27	29	29	28	27	25	23	21	20	72
74								25	27	27	27	26	24	22	21	20	74
76								23	25	26	26	25	24	22	20	19	76
78									23	24	25	24	23	21	20		78
80									21	23	24	23	22	21	20		80
82										22	23	22	21	21			82
84										21	22	21	21				84
86											21	20	20				86
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 24°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	1 28	1 31	1 35	1 42	1 52	2 3	2 16	2 46	3 16	3 47	4 19	4 50	5 20	5 50	6 20	6 50	6
7	1 35	1 27	1 30	1 34	1 39	1 46	1 54	2 15	2 38	3 3	3 29	3 55	4 20	4 46	5 10	5 34	7
8	1 45	1 32	1 26	1 28	1 30	1 35	1 41	1 58	2 17	2 37	2 58	3 18	3 39	4 1	4 20	4 39	8
9	1 56	1 39	1 30	1 25	1 26	1 29	1 34	1 44	1 59	2 15	2 31	2 48	3 6	3 24	3 40	3 56	9
10	2 8	1 48	1 36	1 29	1 25	1 26	1 28	1 35	1 45	1 57	2 13	2 27	2 43	2 58	3 12	3 26	10
11	2 21	1 58	1 43	1 34	1 28	1 24	1 26	1 30	1 36	1 46	1 58	2 11	2 24	2 37	2 49	3 0	11
12	2 36	2 9	1 52	1 41	1 33	1 27	1 24	1 26	1 30	1 37	1 47	1 58	2 9	2 20	2 29	2 38	12
13	2 51	2 20	2 1	1 48	1 38	1 31	1 27	1 24	1 27	1 32	1 40	1 48	1 57	2 6	2 14	2 22	13
14	3 6	2 31	2 10	1 55	1 43	1 35	1 30	1 23	1 25	1 28	1 33	1 40	1 48	1 55	2 2	2 10	14
15	3 21	2 42	2 20	2 2	1 50	1 39	1 33	1 24	1 23	1 25	1 24	1 34	1 40	1 46	1 52	1 59	15
16	3 36	2 54	2 30	2 9	1 56	1 44	1 36	1 26	1 22	1 23	1 25	1 29	1 33	1 38	1 44	1 50	16
17	3 51	3 6	2 40	2 17	2 2	1 49	1 39	1 28	1 23	1 21	1 23	1 26	1 29	1 34	1 39	1 43	17
18	4 6	3 18	2 49	2 25	2 8	1 54	1 43	1 31	1 24	1 20	1 21	1 23	1 26	1 30	1 34	1 37	18
19	4 21	3 30	2 59	2 33	2 14	1 59	1 47	1 33	1 25	1 21	1 20	1 22	1 24	1 27	1 30	1 32	19
20	4 35	3 42	3 9	2 41	2 21	2 5	1 52	1 36	1 27	1 22	1 19	1 20	1 22	1 24	1 26	1 28	20
21	4 50	3 54	3 19	2 50	2 28	2 11	1 56	1 39	1 29	1 23	1 20	1 19	1 20	1 21	1 23	1 25	21
22	5 4	4 6	3 28	2 58	2 35	2 17	2 1	1 42	1 31	1 24	1 20	1 18	1 19	1 19	1 20	1 22	22
23	5 19	4 18	3 38	3 6	2 43	2 23	2 6	1 46	1 33	1 25	1 21	1 18	1 18	1 18	1 18	1 19	23
24	5 33	4 29	3 48	3 14	2 51	2 29	2 12	1 50	1 36	1 27	1 22	1 19	1 17	1 17	1 17	1 17	24
25	5 47	4 41	3 57	3 22	2 58	2 35	2 17	1 53	1 38	1 28	1 23	1 20	1 18	1 16	1 16	1 16	25
26	6 1	4 52	4 6	3 30	3 4	2 41	2 22	1 57	1 41	1 30	1 24	1 20	1 18	1 16	1 15	1 15	26
27	6 14	5 4	4 15	3 38	3 10	2 47	2 27	2 0	1 43	1 32	1 25	1 21	1 18	1 15	1 14	1 13	27
28	6 27	5 15	4 23	3 45	3 16	2 53	2 32	2 4	1 46	1 34	1 27	1 21	1 18	1 15	1 13	1 12	28
29	6 38	5 26	4 32	3 53	3 22	2 58	2 38	2 8	1 49	1 36	1 28	1 22	1 18	1 15	1 13	1 11	29
30	6 50	5 36	4 41	4 0	3 28	3 3	2 44	2 12	1 52	1 38	1 29	1 23	1 19	1 15	1 13	1 11	30
31	7 0	5 45	4 50	4 7	3 34	3 8	2 49	2 16	1 55	1 40	1 30	1 24	1 19	1 15	1 13	1 11	31
32		5 53	4 58	4 14	3 40	3 13	2 54	2 19	1 57	1 41	1 31	1 24	1 19	1 15	1 13	1 11	32
33			5 5	4 20	3 46	3 18	2 58	2 22	1 59	1 42	1 31	1 24	1 19	1 15	1 13	1 11	33
34				4 25	3 51	3 22	3 1	2 24	2 1	1 43	1 32	1 25	1 20	1 15	1 13	1 11	34
35					3 56	3 26	3 3	2 26	2 2	1 45	1 33	1 25	1 20	1 15	1 13	1 11	35
36						3 30	3 5	2 28	2 4	1 46	1 34	1 25	1 20	1 15	1 12	1 10	36
37							3 7	2 30	2 6	1 47	1 35	1 25	1 20	1 15	1 12	1 10	37
38								2 32	2 7	1 48	1 35	1 25	1 20	1 15	1 12	1 10	38
39								2 34	2 8	1 49	1 35	1 25	1 19	1 15	1 12	1 10	39
40									2 9	1 50	1 35	1 25	1 19	1 15	1 11	1 9	40
41									2 10	1 50	1 35	1 25	1 19	1 15	1 11	1 8	41
42										1 51	1 36	1 25	1 19	1 14	1 10	1 7	42
43										1 52	1 36	1 25	1 18	1 13	1 9	1 6	43
44											1 36	1 25	1 18	1 13	1 8	1 5	44
46											1 36	1 25	1 17	1 12	1 7	1 3	46
48												1 25	1 17	1 10	1 5	1 1	48
50													1 17	1 8	1 4	59	50
52														1 7	1 3	58	52
54															1 2	57	54
56																56	56
58																	58
60																	60
62																	62
64																	64
66																	66
68																	68
70																	70
72																	72
74																	74
76																	76
78																	78
80																	80
82																	82
84																	84
86																	86
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE XVIII.

THIRD CORRECTION to APPARENT DISTANCE 24°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6																	6
7																	7
8	4 58																8
9	4 12																9
10	3 39	3 51															10
11	3 11	3 21	3 30														11
12	2 48	2 56	3 5	3 12													12
13	2 30	2 37	2 44	2 49													13
14	2 16	2 22	2 27	2 32													14
15	2 4	2 9	2 14	2 18													15
16	1 54	1 59	2 3	2 6	2 11												16
17	1 46	1 50	1 53	1 56	2 0												17
18	1 40	1 43	1 45	1 47	1 51												18
19	1 35	1 37	1 39	1 41	1 43												19
20	1 30	1 32	1 33	1 34	1 36	1 38											20
21	1 26	1 27	1 28	1 29	1 30	1 31											21
22	1 22	1 23	1 24	1 24	1 25	1 25											22
23	1 20	1 20	1 21	1 21	1 21	1 21											23
24	1 18	1 18	1 19	1 19	1 18	1 17	1 15										24
25	1 16	1 16	1 17	1 17	1 16	1 14	1 11										25
26	1 14	1 14	1 14	1 14	1 13	1 11	1 8										26
27	1 13	1 13	1 12	1 12	1 11	1 9	1 6										27
28	1 12	1 12	1 11	1 10	1 9	1 7	1 4	1 1									28
29	1 11	1 11	1 10	1 9	1 8	1 5	1 2	59									29
30	1 11	1 10	1 9	1 8	1 7	1 4	1 0	57									30
31	1 10	1 9	1 8	1 8	1 6	1 2	58	55									31
32	1 9	1 9	1 8	1 7	1 5	1 1	57	54	51								32
33	1 9	1 8	1 7	1 6	1 4	1 1	57	53	50								33
34	1 9	1 7	1 6	1 5	1 3	1 0	57	53	49								34
35	1 9	1 7	1 6	1 5	1 2	1 0	56	52	48								35
36	1 8	1 7	1 6	1 4	1 2	1 0	56	51	47	44							36
37	1 8	1 6	1 5	1 3	1 1	58	55	51	46	43							37
38	1 8	1 6	1 5	1 3	1 0	57	54	50	46	43							38
39	1 8	1 6	1 4	1 2	59	56	52	48	45	42							39
40	1 7	1 5	1 4	1 2	59	55	51	47	44	41	39						40
41	1 6	1 4	1 3	1 1	58	54	50	47	44	41	38						41
42	1 5	1 4	1 3	1 1	57	54	50	47	44	41	38						42
43	1 4	1 3	1 2	1 0	56	53	50	47	43	40	37	34					43
44	1 3	1 2	1 1	59	56	53	50	47	43	40	37	34					44
46	1 1	1 0	59	58	55	52	49	46	43	40	37	34	32				46
48	59	59	58	57	54	51	49	46	43	40	37	34	32				48
50	57	57	56	55	53	50	48	45	43	40	37	34	32	30			50
52	55	54	53	52	51	49	47	45	43	40	37	34	32	30			52
54	54	52	51	50	49	47	46	44	42	39	37	34	32	29	27		54
56	53	51	49	48	47	45	44	43	41	38	36	34	31	29	27		56
58	52	49	47	46	45	44	43	42	40	37	35	33	31	29	27	26	58
60		47	45	44	43	42	41	40	38	36	34	32	30	28	27	26	60
62			43	43	41	40	39	38	37	35	33	31	29	28	27	26	62
64				42	39	38	38	37	36	34	32	30	29	28	27	26	64
66					38	37	37	36	35	33	31	29	28	27	26	25	66
68					37	35	35	34	34	33	31	29	25	27	26	25	68
70						34	34	33	33	32	30	28	27	26	25	25	70
72						33	33	32	32	31	29	28	26	25	24	25	72
74							32	31	31	30	29	28	26	25	24		74
76							31	30	30	29	28	27	25	24	24		76
78								29	29	29	28	27	25	24			78
80								28	28	28	27	26	25	24			80
82									27	27	26	25	24				82
84									26	26	25	25	24				84
86										26	25	25					86
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 28°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	' "	' "	' "	' "	' "	' "	' "	' "	' "	' "	' "	' '	' "	' "	' "	' "	°
6	1 20	1 23	1 27	1 33	1 40	1 49	2 00	2 28	2 56	3 24	3 53	4 21	4 48	5 15	5 42	6 9	6
7	1 25	1 20	1 23	1 27	1 32	1 38	1 45	2 5	2 26	2 49	3 13	3 36	3 58	4 20	4 43	5 6	7
8	1 32	1 24	1 20	1 22	1 25	1 29	1 35	1 50	2 7	2 26	2 46	3 4	3 23	3 42	4 1	4 20	8
9	1 41	1 29	1 23	1 20	1 22	1 24	1 28	1 39	1 52	2 7	2 22	2 37	2 53	3 9	3 25	3 41	9
10	1 53	1 37	1 28	1 23	1 20	1 21	1 23	1 30	1 39	1 52	1 5	2 18	2 31	2 44	2 58	3 11	10
11	2 6	1 46	1 34	1 27	1 23	1 20	1 21	1 24	1 31	1 41	1 52	2 4	2 15	2 26	2 37	2 48	11
12	2 19	1 56	1 41	1 32	1 26	1 22	1 19	1 21	1 26	1 33	1 42	1 52	2 1	2 10	2 20	2 30	12
13	2 32	2 6	1 49	1 38	1 30	1 25	1 21	1 20	1 23	1 28	1 34	1 42	1 49	1 57	2 6	2 15	13
14	2 46	2 17	1 58	1 44	1 34	1 28	1 23	1 19	1 21	1 24	1 28	1 34	1 40	1 47	1 55	2 3	14
15	3 00	2 28	2 7	1 51	1 39	1 32	1 25	1 20	1 19	1 21	1 24	1 28	1 33	1 39	1 45	1 52	15
16	3 14	2 39	2 16	1 58	1 45	1 36	1 28	1 21	1 18	1 19	1 21	1 24	1 28	1 33	1 38	1 44	16
17	3 28	2 51	2 25	2 5	1 51	1 41	1 32	1 23	1 19	1 18	1 19	1 21	1 24	1 28	1 33	1 38	17
18	3 41	3 2	2 35	2 13	1 58	1 46	1 36	1 25	1 20	1 17	1 18	1 19	1 21	1 24	1 28	1 33	18
19	3 55	3 13	2 45	2 21	2 5	1 52	1 41	1 27	1 21	1 18	1 16	1 17	1 18	1 21	1 24	1 28	19
20	4 9	3 24	2 55	2 29	2 11	1 57	1 46	1 30	1 23	1 18	1 16	1 15	1 16	1 18	1 21	1 24	20
21	4 23	3 35	3 4	2 37	2 17	2 3	1 51	1 33	1 25	1 19	1 16	1 14	1 15	1 16	1 18	1 20	21
22	4 36	3 46	3 13	2 45	2 24	2 9	1 56	1 36	1 27	1 20	1 16	1 13	1 14	1 15	1 16	1 17	22
23	4 49	3 57	3 22	2 53	2 31	2 14	2 1	1 40	1 29	1 22	1 17	1 13	1 13	1 13	1 14	1 15	23
24	5 2	4 8	3 31	3 0	2 37	2 20	2 6	1 43	1 31	1 24	1 18	1 14	1 12	1 12	1 12	1 13	24
25	5 16	4 19	3 40	3 8	2 43	2 26	2 11	1 47	1 34	1 26	1 19	1 15	1 13	1 11	1 11	1 12	25
26	5 29	4 30	3 49	3 15	2 50	2 32	2 16	1 51	1 36	1 28	1 20	1 15	1 13	1 11	1 11	1 11	26
27	5 42	4 41	3 58	3 23	2 57	2 38	2 21	1 55	1 39	1 30	1 21	1 16	1 13	1 11	1 10	1 10	27
28	5 55	4 52	4 7	3 30	3 4	2 44	2 26	1 59	1 42	1 32	1 22	1 17	1 14	1 11	1 10	1 10	28
29	6 7	5 3	4 16	3 38	3 11	2 50	2 31	2 3	1 45	1 34	1 24	1 18	1 14	1 12	1 10	1 10	29
30	6 19	5 13	4 25	3 45	3 18	2 55	2 36	2 7	1 47	1 36	1 26	1 19	1 15	1 12	1 10	1 9	30
31	6 31	5 23	4 34	3 52	3 25	3 1	2 41	2 10	1 50	1 38	1 27	1 20	1 15	1 12	1 10	1 9	31
32	6 42	5 32	4 43	3 59	3 31	3 7	2 46	2 13	1 53	1 40	1 29	1 21	1 16	1 12	1 10	1 9	22
33	6 53	5 41	4 51	4 6	3 37	3 12	2 51	2 17	1 56	1 42	1 31	1 22	1 16	1 12	1 10	1 9	33
34	7 4	5 50	4 58	4 13	3 43	3 17	2 55	2 20	1 58	1 44	1 32	1 23	1 17	1 12	1 10	1 9	34
35	7 15	5 59	5 5	4 20	3 48	3 21	2 59	2 23	2 00	1 46	1 33	1 23	1 17	1 13	1 10	1 8	35
36		6 8	5 11	4 26	3 53	3 25	3 3	2 26	2 3	1 47	1 34	1 24	1 18	1 13	1 10	1 8	36
37			5 17	4 32	3 58	3 29	3 7	2 29	2 5	1 49	1 35	1 25	1 18	1 13	1 10	1 8	37
38				4 38	4 2	3 33	3 10	2 32	2 7	1 51	1 36	1 26	1 19	1 14	1 10	1 8	38
39					4 6	3 37	3 12	2 34	2 9	1 52	1 37	1 27	1 19	1 14	1 11	1 8	39
40						3 41	3 15	2 37	2 11	1 53	1 38	1 27	1 20	1 15	1 11	1 8	40
41							3 17	2 40	2 13	1 54	1 39	1 28	1 20	1 15	1 11	1 8	41
42								2 42	2 15	1 55	1 40	1 29	1 21	1 15	1 10	1 7	42
43								2 44	2 17	1 56	1 40	1 29	1 21	1 15	1 10	1 7	43
44									2 18	1 57	1 41	1 30	1 21	1 15	1 10	1 7	44
46									2 19	1 59	1 42	1 30	1 22	1 15	1 10	1 7	46
48										2 0	1 43	1 31	1 22	1 15	1 10	1 6	48
50											1 44	1 32	1 23	1 15	1 10	1 6	50
52												1 33	1 24	1 15	1 9	1 5	52
54													1 25	1 15	1 9	1 5	54
56														1 15	1 9	1 4	56
58															1 9	1 3	58
60																1 3	60
62																	62
64																	64
66																	66
68																	68
70																	70
72																	72
74																	74
76																	76
78																	78
80																	80
82																	82
84																	84
86																	86
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE XVIII.

THIRD CORRECTION to APPARENT DISTANCE 28°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	6 37	7 4															6
7	5 28	5 49	6 8														7
8	4 40	4 57	5 11														8
9	3 58	4 13	4 26	4 38													9
10	3 25	3 38	3 50	4 2													10
11	3 0	3 12	3 23	3 33													11
12	2 40	2 50	2 59	3 7	3 22												12
13	2 24	2 33	2 41	2 48	3 0												13
14	2 11	2 18	2 25	2 31	2 42												14
15	1 59	2 6	2 12	2 17	2 27												15
16	1 50	1 56	2 1	2 6	2 14	2 21											16
17	1 43	1 48	1 52	1 56	2 3	2 9											17
18	1 37	1 41	1 45	1 48	1 54	1 59											18
19	1 31	1 35	1 38	1 41	1 46	1 50											19
20	1 26	1 29	1 32	1 34	1 38	1 42	1 45										20
21	1 22	1 25	1 27	1 29	1 32	1 36	1 38										21
22	1 19	1 21	1 23	1 25	1 28	1 30	1 32										22
23	1 17	1 18	1 20	1 22	1 21	1 26	1 27										23
24	1 15	1 16	1 17	1 18	1 20	1 22	1 23	1 24									24
25	1 13	1 14	1 14	1 15	1 16	1 18	1 19	1 19									25
26	1 11	1 12	1 12	1 13	1 13	1 14	1 15	1 15									26
27	1 10	1 11	1 11	1 11	1 11	1 11	1 12	1 12									27
28	1 10	1 10	1 10	1 10	1 10	1 9	1 9	1 9	1 9								28
29	1 10	1 10	1 10	1 9	1 9	1 8	1 7	1 6	1 6								29
30	1 9	1 9	1 9	1 8	1 8	1 7	1 6	1 4	1 3								30
31	1 8	1 8	1 7	1 7	1 6	1 5	1 4	1 2	1 1								31
32	1 8	1 7	1 6	1 6	1 5	1 4	1 3	1 1	1 0	59							32
33	1 7	1 6	1 5	1 5	1 4	1 3	1 2	1 0	58	56							33
34	1 7	1 5	1 4	1 4	1 3	1 2	1 1	59	57	54							34
35	1 7	1 5	1 4	1 3	1 2	1 1	1 0	58	55	53							35
36	1 6	1 5	1 4	1 3	1 1	1 0	58	56	54	52	51						36
37	1 6	1 4	1 3	1 2	1 0	59	57	55	53	51	50						37
38	1 6	1 4	1 3	1 1	59	58	56	54	52	50	49						38
39	1 6	1 4	1 2	1 0	59	57	55	53	51	49	47						39
40	1 6	1 4	1 2	1 0	58	57	55	52	50	48	46	44					40
41	1 6	1 4	1 2	1 0	58	56	54	51	49	47	45	43					41
42	1 5	1 4	1 2	59	57	55	53	50	48	46	44	42					42
43	1 5	1 3	1 1	59	57	55	53	50	48	46	44	42	41				43
44	1 5	1 3	1 1	59	56	54	52	50	47	45	43	41	40				44
46	1 4	1 2	1 0	58	55	53	51	49	47	44	42	40	39				46
48	1 3	1 1	59	57	54	52	50	48	46	43	42	39	38	37			48
50	1 3	1 1	58	56	53	51	49	47	45	42	40	38	37	36			50
52	1 2	1 0	57	55	52	50	48	46	44	42	40	38	36	35	34		52
54	1 2	59	56	54	51	49	47	45	43	41	39	37	35	34	33		54
56	1 1	58	55	53	50	48	46	44	42	40	38	36	35	34	33	32	56
58	1 0	57	54	52	49	47	45	43	41	39	37	36	35	34	32	31	58
60	58	55	53	51	48	46	44	42	40	38	37	36	35	34	32	31	60
62	56	54	52	50	47	45	43	41	39	38	37	36	35	34	32	31	62
64		52	50	49	46	44	42	40	38	37	36	35	34	33	32	30	64
66			48	48	45	43	41	39	38	37	36	35	34	33	31	29	66
68				46	43	41	40	38	37	36	35	34	33	32	30	28	68
70					42	40	39	38	37	36	35	34	33	31	29		70
72					41	39	38	37	36	35	34	33	32	30	28		72
74						39	37	36	35	34	33	32	30	28			74
76						38	36	35	34	34	33	31	29	27			76
78							36	34	34	33	32	30	28				78
80							35	34	33	32	31	30	28				80
82								33	32	31	30	29					82
84								32	32	31	30	29					84
86									31	30	29						86
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	

TABLE XVIII

THIRD CORRECTION to APPARENT DISTANCE 32°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	1 18	1 21	1 25	1 30	1 37	1 47	1 59	2 23	2 48	3 13	3 39	4 5	4 30	4 55	5 20	5 45	6
7	1 23	1 18	1 21	1 24	1 28	1 33	1 42	2 0	2 18	2 37	2 58	3 20	3 42	4 4	4 25	4 46	7
8	1 30	1 22	1 18	1 20	1 22	1 25	1 29	1 42	1 57	2 14	2 32	2 50	3 8	3 26	3 44	4 2	8
9	1 38	1 27	1 20	1 18	1 19	1 21	1 23	1 31	1 44	1 58	2 12	2 26	2 41	2 56	3 11	3 26	9
10	1 47	1 33	1 23	1 20	1 18	1 19	1 20	1 25	1 34	1 45	1 57	2 9	2 21	2 34	2 46	2 59	10
11	1 57	1 41	1 28	1 23	1 19	1 17	1 18	1 21	1 27	1 36	1 46	1 56	2 6	2 17	2 28	2 39	11
12	2 9	1 50	1 34	1 27	1 22	1 19	1 17	1 19	1 23	1 29	1 37	1 46	1 55	2 4	2 13	2 23	12
13	2 21	1 59	1 41	1 32	1 26	1 21	1 18	1 17	1 20	1 24	1 30	1 37	1 45	1 53	2 1	2 9	13
14	2 34	2 8	1 50	1 38	1 30	1 24	1 20	1 16	1 18	1 21	1 25	1 30	1 36	1 43	1 51	1 58	14
15	2 47	2 18	1 59	1 45	1 35	1 28	1 22	1 17	1 16	1 18	1 21	1 25	1 30	1 35	1 42	1 49	15
16	2 59	2 28	2 7	1 52	1 41	1 32	1 25	1 19	1 15	1 16	1 18	1 21	1 25	1 29	1 35	1 41	16
17	3 12	2 38	2 16	1 59	1 47	1 36	1 28	1 21	1 16	1 15	1 16	1 18	1 21	1 25	1 30	1 35	17
18	3 25	2 48	2 25	2 7	1 52	1 41	1 32	1 23	1 17	1 14	1 15	1 17	1 19	1 22	1 25	1 29	18
19	3 38	2 58	2 34	2 14	1 58	1 46	1 36	1 25	1 18	1 15	1 14	1 15	1 17	1 19	1 22	1 25	19
20	3 50	3 9	2 43	2 21	2 4	1 51	1 40	1 27	1 20	1 16	1 13	1 14	1 15	1 17	1 19	1 21	20
21	4 3	3 19	2 52	2 28	2 10	1 56	1 45	1 30	1 22	1 17	1 14	1 13	1 14	1 15	1 16	1 18	21
22	4 15	3 30	3 0	2 35	2 17	2 2	1 50	1 33	1 24	1 18	1 14	1 11	1 12	1 13	1 14	1 16	22
23	4 28	3 40	3 9	2 42	2 24	2 7	1 55	1 36	1 26	1 19	1 15	1 12	1 11	1 12	1 13	1 14	23
24	4 40	3 51	3 17	2 50	2 30	2 13	1 59	1 39	1 28	1 21	1 16	1 12	1 10	1 11	1 11	1 12	24
25	4 52	4 1	3 26	2 57	2 36	2 18	2 4	1 42	1 30	1 22	1 17	1 13	1 11	1 10	1 10	1 10	25
26	5 4	4 12	3 34	3 5	2 43	2 24	2 8	1 46	1 32	1 24	1 18	1 13	1 11	1 9	1 9	1 9	26
27	5 16	4 22	3 43	3 12	2 50	2 30	2 13	1 50	1 34	1 26	1 19	1 14	1 11	1 9	1 8	1 8	27
28	5 28	4 33	3 52	3 20	2 57	2 35	2 17	1 53	1 37	1 27	1 20	1 15	1 11	1 9	1 7	1 8	28
29	5 41	4 44	4 1	3 28	3 3	2 41	2 21	1 57	1 40	1 29	1 21	1 16	1 12	1 10	1 8	1 7	29
30	5 53	4 54	4 10	3 35	3 10	2 46	2 26	2 0	1 43	1 31	1 23	1 17	1 13	1 10	1 8	1 6	30
31	6 5	5 4	4 19	3 42	3 15	2 52	2 31	2 4	1 46	1 33	1 24	1 18	1 13	1 10	1 8	1 6	31
32	6 17	5 14	4 27	3 49	3 21	2 57	2 36	2 8	1 49	1 36	1 26	1 19	1 14	1 11	1 9	1 7	32
33	6 29	5 23	4 35	3 56	3 27	3 2	2 41	2 12	1 52	1 38	1 27	1 20	1 15	1 11	1 9	1 7	33
34	6 40	5 32	4 43	4 3	3 32	3 7	2 46	2 15	1 55	1 40	1 29	1 21	1 16	1 12	1 9	1 7	34
35	6 50	5 40	4 50	4 9	3 38	3 12	2 50	2 19	1 58	1 43	1 31	1 22	1 17	1 13	1 9	1 7	35
36	6 59	5 48	4 57	4 15	3 43	3 16	2 54	2 22	2 1	1 45	1 32	1 23	1 18	1 13	1 10	1 7	36
37	7 7	5 56	5 4	4 21	3 49	3 21	2 59	2 25	2 4	1 47	1 34	1 24	1 19	1 14	1 10	1 7	37
38	7 15	6 3	5 10	4 29	3 54	3 25	3 3	2 28	2 6	1 49	1 35	1 25	1 19	1 14	1 10	1 7	38
39	7 22	6 10	5 16	4 33	3 59	3 30	3 7	2 31	2 8	1 51	1 36	1 26	1 20	1 15	1 10	1 7	39
40		6 17	5 21	4 38	4 4	3 34	3 11	2 34	2 10	1 52	1 38	1 27	1 20	1 15	1 11	1 8	40
41			5 26	4 43	4 8	3 38	3 15	2 36	2 13	1 54	1 39	1 28	1 21	1 16	1 12	1 8	41
42				4 47	4 12	3 42	3 18	2 39	2 16	1 56	1 41	1 29	1 22	1 16	1 12	1 8	42
43					4 16	3 46	3 21	2 42	2 18	1 58	1 42	1 30	1 22	1 16	1 12	1 8	43
44						3 50	3 24	2 45	2 20	2 0	1 43	1 31	1 23	1 17	1 12	1 8	44
46							3 27	2 50	2 23	2 2	1 45	1 32	1 24	1 17	1 12	1 8	46
48								2 54	2 26	2 4	1 47	1 34	1 25	1 18	1 12	1 8	48
50									2 29	2 6	1 49	1 36	1 26	1 19	1 13	1 8	50
52										2 8	1 51	1 38	1 28	1 19	1 13	1 8	52
54											1 53	1 39	1 29	1 20	1 14	1 8	54
56												1 40	1 30	1 21	1 14	1 8	56
58													1 30	1 21	1 14	1 8	58
60														1 21	1 14	1 8	60
62															1 14	1 8	62
64																1 8	64
66																	66
68																	68
70																	70
72																	72
74																	74
76																	76
78																	78
80																	80
82																	82
84																	84
86																	86
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 32°.

☽'s Ap Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	6 10	6 33	6 55	7 15													6
7	5 7	5 26	5 44	6 2													7
8	4 20	4 37	4 52	5 7	5 35												8
9	3 41	3 56	4 10	4 24	4 50												9
10	3 12	3 25	3 38	3 50	4 12												10
11	2 51	3 2	3 13	3 23	3 42												11
12	2 33	2 43	2 51	3 00	3 17	3 33											12
13	2 18	2 26	2 34	2 42	2 56	3 9											13
14	2 5	2 12	2 19	2 27	2 39	2 50											14
15	1 55	2 2	2 8	2 14	2 25	2 35											15
16	1 47	1 53	1 58	2 3	2 13	2 22	2 30										16
17	1 40	1 45	1 50	1 54	2 2	2 11	2 18										17
18	1 34	1 38	1 42	1 46	1 53	2 0	2 7										18
19	1 29	1 33	1 36	1 39	1 45	1 51	1 57										19
20	1 25	1 28	1 31	1 33	1 38	1 43	1 49	1 54									20
21	1 21	1 24	1 26	1 28	1 32	1 37	1 42	1 46									21
22	1 18	1 20	1 22	1 24	1 27	1 31	1 35	1 39									22
23	1 15	1 17	1 19	1 20	1 23	1 27	1 30	1 34									23
24	1 13	1 14	1 16	1 17	1 20	1 23	1 26	1 29	1 32								24
25	1 11	1 12	1 13	1 15	1 17	1 19	1 21	1 24	1 26								25
26	1 9	1 10	1 11	1 12	1 14	1 16	1 17	1 19	1 21								26
27	1 8	1 9	1 9	1 10	1 12	1 13	1 14	1 16	1 17								27
28	1 8	1 8	1 8	1 9	1 10	1 11	1 12	1 13	1 14	1 15							28
29	1 7	1 7	1 7	1 7	1 8	1 9	1 9	1 10	1 11	1 11							29
30	1 6	1 6	1 6	1 6	1 6	1 7	1 7	1 7	1 8	1 8							30
31	1 6	1 6	1 6	1 5	1 5	1 5	1 5	1 5	1 5	1 5							31
32	1 6	1 5	1 5	1 4	1 4	1 4	1 4	1 4	1 3	1 3	1 3						32
33	1 5	1 4	1 4	1 3	1 3	1 2	1 2	1 2	1 1	1 1	1 1						33
34	1 5	1 4	1 3	1 2	1 2	1 1	1 0	1 0	59	59	59						34
35	1 5	1 3	1 3	1 2	1 1	1 0	59	58	57	57	57						35
36	1 5	1 3	1 2	1 1	1 1	1 0	58	57	56	56	55	54					36
37	1 5	1 3	1 1	1 0	1 0	59	57	56	55	55	54	53					37
38	1 5	1 3	1 1	1 0	59	58	56	55	54	54	53	52					38
39	1 5	1 3	1 1	59	58	57	56	54	53	52	51	50					39
40	1 5	1 2	1 0	59	58	56	55	53	52	51	50	49	48				40
41	1 5	1 2	1 0	59	58	56	54	52	51	50	49	48	47				41
42	1 5	1 2	1 0	59	57	55	53	51	50	49	48	47	47				42
43	1 5	1 2	1 0	58	56	54	52	51	49	48	47	47	46	45			43
44	1 5	1 2	1 0	58	55	53	51	50	49	48	47	46	45	44			44
46	1 5	1 2	1 0	58	55	52	51	50	48	47	46	45	44	43			46
48	1 5	1 2	59	57	55	52	50	49	47	46	45	44	43	42	41		48
50	1 5	1 2	59	57	54	51	49	48	47	46	44	43	42	41	40		50
52	1 4	1 1	58	56	53	51	49	47	46	45	43	42	41	40	39	38	52
54	1 4	1 1	58	56	53	50	48	46	45	44	42	41	40	39	38	37	54
56	1 4	1 1	58	56	52	49	47	45	44	42	41	40	39	38	37	36	56
58	1 4	1 1	58	56	52	49	47	45	43	41	40	39	38	37	36	35	58
60	1 4	1 0	57	55	51	48	46	44	42	40	39	38	37	36	35	35	60
62	1 3	59	56	54	51	48	45	43	41	39	38	37	36	35	34	34	62
64	1 3	59	56	54	50	47	45	43	41	38	38	37	36	35	34	33	64
66	1 3	59	56	54	50	47	44	42	40	38	37	36	35	34	33		66
68		59	55	53	48	46	44	42	40	38	37	36	35	34	33		68
70			55	52	48	45	43	41	39	37	36	35	34	33			70
72				52	47	44	42	40	38	37	36	35	33	32			72
74					47	44	42	40	38	36	35	34	32				74
76					47	43	41	39	38	36	35	34	32				76
78						43	41	39	37	35	34	33					78
80						43	41	39	37	35	34	33					80
82							40	38	36	34	33						82
84							39	38	36	34	33						84
86								37	35	34							86
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 36°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	1 17	1 19	1 22	1 27	1 33	1 42	1 52	2 13	2 34	2 56	3 19	3 43	4 7	4 31	4 55	5 18	6
7	1 20	1 17	1 19	1 22	1 26	1 31	1 37	1 52	2 10	2 28	2 48	3 8	3 27	3 46	4 6	4 25	7
8	1 25	1 20	1 17	1 19	1 21	1 23	1 27	1 39	1 53	2 8	2 24	2 40	2 57	3 14	3 30	3 46	8
9	1 32	1 24	1 19	1 17	1 18	1 19	1 21	1 29	1 40	1 52	2 5	2 19	2 33	2 47	3 2	3 16	9
10	1 42	1 30	1 23	1 19	1 16	1 17	1 18	1 23	1 31	1 40	1 51	2 2	2 14	2 27	2 40	2 52	10
11	1 52	1 37	1 28	1 22	1 18	1 16	1 17	1 19	1 25	1 33	1 42	1 51	2 1	2 12	2 23	2 33	11
12	2 3	1 45	1 34	1 26	1 20	1 17	1 15	1 17	1 21	1 27	1 34	1 41	1 50	1 59	2 8	2 17	12
13	2 14	1 53	1 40	1 30	1 23	1 19	1 16	1 15	1 18	1 23	1 28	1 34	1 41	1 49	1 57	2 5	13
14	2 25	2 1	1 47	1 35	1 26	1 21	1 18	1 14	1 16	1 19	1 24	1 29	1 35	1 41	1 49	1 55	14
15	2 36	2 10	1 54	1 41	1 30	1 25	1 21	1 16	1 15	1 17	1 21	1 25	1 30	1 35	1 41	1 46	15
16	2 48	2 20	2 2	1 47	1 35	1 29	1 24	1 18	1 13	1 15	1 18	1 21	1 25	1 29	1 34	1 39	16
17	3 0	2 30	2 10	1 53	1 40	1 33	1 28	1 20	1 15	1 14	1 16	1 18	1 21	1 24	1 28	1 33	17
18	3 12	2 40	2 18	2 0	1 46	1 38	1 32	1 22	1 16	1 13	1 15	1 16	1 18	1 20	1 23	1 27	18
19	3 24	2 49	2 27	2 7	1 51	1 43	1 36	1 25	1 18	1 15	1 14	1 15	1 16	1 18	1 20	1 23	19
20	3 35	2 59	2 35	2 14	1 57	1 48	1 40	1 28	1 21	1 16	1 12	1 13	1 14	1 16	1 18	1 20	20
21	3 46	3 9	2 43	2 21	2 3	1 53	1 44	1 31	1 23	1 17	1 13	1 12	1 13	1 14	1 16	1 18	21
22	3 57	3 18	2 51	2 28	2 9	1 58	1 48	1 34	1 25	1 18	1 14	1 11	1 12	1 13	1 14	1 15	22
23	4 9	3 28	2 59	2 35	2 16	2 3	1 52	1 36	1 26	1 19	1 14	1 11	1 10	1 11	1 12	1 13	23
24	4 20	3 37	3 7	2 42	2 22	2 8	1 56	1 39	1 28	1 20	1 15	1 11	1 9	1 9	1 10	1 11	24
25	4 32	3 47	3 15	2 49	2 28	2 13	2 0	1 42	1 30	1 22	1 15	1 11	1 9	1 8	1 8	1 9	25
26	4 43	3 56	3 23	2 56	2 34	2 18	2 4	1 45	1 32	1 23	1 16	1 12	1 9	1 7	1 7	1 7	26
27	4 55	4 6	3 31	3 3	2 40	2 23	2 9	1 48	1 35	1 25	1 17	1 12	1 9	1 7	1 6	1 6	27
28	5 6	4 15	3 39	3 10	2 46	2 28	2 13	1 52	1 38	1 27	1 19	1 13	1 9	1 7	1 6	1 6	28
29	5 17	4 25	3 47	3 17	2 52	2 34	2 18	1 56	1 40	1 29	1 20	1 13	1 9	1 7	1 6	1 5	29
30	5 28	4 34	3 54	3 24	2 58	2 39	2 23	2 0	1 43	1 31	1 21	1 14	1 10	1 8	1 6	1 5	30
31	5 39	4 43	4 2	3 31	3 4	2 44	2 28	2 4	1 46	1 33	1 23	1 16	1 11	1 8	1 6	1 5	31
32	5 49	4 52	4 10	3 37	3 10	2 49	2 33	2 7	1 49	1 35	1 25	1 17	1 12	1 9	1 7	1 5	32
33	5 59	5 0	4 18	3 44	3 16	2 54	2 37	2 10	1 51	1 37	1 27	1 19	1 14	1 10	1 7	1 5	33
34	6 9	5 8	4 25	3 50	3 22	2 59	2 41	2 13	1 53	1 39	1 29	1 21	1 15	1 11	1 8	1 6	34
35	6 19	5 16	4 32	3 56	3 28	3 4	2 46	2 16	1 56	1 41	1 30	1 22	1 16	1 11	1 8	1 6	35
36	6 28	5 24	4 38	4 2	3 33	3 9	2 50	2 19	1 59	1 43	1 32	1 23	1 17	1 12	1 9	1 6	36
37	6 38	5 32	4 45	4 8	3 39	3 14	2 54	2 22	2 1	1 45	1 33	1 24	1 18	1 13	1 9	1 6	37
38	6 47	5 40	4 52	4 14	3 44	3 18	2 58	2 25	2 4	1 47	1 35	1 26	1 19	1 14	1 10	1 6	38
39	6 57	5 48	4 59	4 20	3 49	3 23	3 2	2 28	2 6	1 49	1 36	1 27	1 20	1 14	1 10	1 7	39
40	7 6	5 56	5 5	4 25	3 54	3 27	3 6	2 31	2 8	1 51	1 38	1 28	1 21	1 15	1 11	1 7	40
41	7 16	6 4	5 12	4 31	3 59	3 31	3 10	2 33	2 11	1 53	1 40	1 30	1 22	1 15	1 11	1 8	41
42	7 25	6 12	5 18	4 36	4 3	3 35	3 13	2 36	2 14	1 55	1 42	1 31	1 22	1 16	1 11	1 8	42
43	7 33	6 19	5 24	4 41	4 8	3 39	3 17	2 39	2 16	1 57	1 43	1 32	1 23	1 16	1 11	1 8	43
44		6 26	5 30	4 46	4 12	3 43	3 20	2 42	2 18	1 59	1 45	1 33	1 24	1 17	1 12	1 9	44
46			5 41	4 55	4 20	3 50	3 26	2 47	2 22	2 2	1 47	1 35	1 25	1 18	1 13	1 9	46
48					4 27	3 57	3 32	2 52	2 26	2 5	1 49	1 37	1 27	1 20	1 14	1 10	48
50							3 38	2 57	2 30	2 8	1 51	1 39	1 29	1 21	1 15	1 10	50
52								3 1	2 33	2 11	1 53	1 41	1 31	1 22	1 16	1 11	52
54									2 36	2 13	1 55	1 43	1 32	1 23	1 16	1 11	51
56										2 15	1 57	1 44	1 33	1 24	1 17	1 11	56
											1 59	1 45	1 34	1 25	1 18	1 12	58
												1 46	1 35	1 26	1 18	1 12	60
													1 36	1 26	1 18	1 12	62
														1 26	1 19	1 12	64
															1 19	1 13	66
																1 13	68
																	70
																	72
																	74
																	76
																	78
																	80
																	82
																	84
																	86
						11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE P. EFFECT OF SUN'S PAR.

Add the Numbers above the lines to 3rd Correction, subtract the others.

☽'s App Alt.	Sun's Apparent Altitude.									
	5	10	20	30	40	50	60	70	80	90
	″	″	″	″	″	″	″	″	″	″
5	0	1	3	5	7					
10	1	0	2	4	5					
20	4	3	1	1	3	4				
30	6	5	3	1	0	2	3			
40	9	8	5	3	2	0	1	2		
50			7	5	4	2	1	0	1	
60				7	5	4	3	2	1	0
70					6	5	4	3	2	
80						6	4			

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 36°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	5 40	6 1	6 22	6 43	7 24												6
7	4 43	5 1	5 19	5 36	6 11												7
8	4 1	4 16	4 31	4 46	5 16	5 45											8
9	3 29	3 42	3 55	4 8	4 33	4 58											9
10	3 4	3 16	3 27	3 38	3 59	4 20											10
11	2 43	2 54	3 4	3 13	3 32	3 50											11
12	2 27	2 36	2 45	2 53	3 10	3 25	3 40										12
13	2 13	2 21	2 29	2 37	2 51	3 4	3 16										13
14	2 2	2 9	2 16	2 23	2 36	2 47	2 57										14
15	1 53	1 59	2 5	2 11	2 23	2 33	2 42										15
16	1 45	1 50	1 56	2 1	2 12	2 21	2 29	2 36									16
17	1 38	1 42	1 47	1 53	2 2	2 10	2 17	2 24									17
18	1 32	1 36	1 40	1 45	1 53	2 1	2 7	2 13									18
19	1 27	1 30	1 34	1 38	1 45	1 52	1 58	2 3									19
20	1 23	1 26	1 29	1 33	1 38	1 44	1 49	1 54	1 58								20
21	1 20	1 22	1 25	1 28	1 33	1 38	1 43	1 47	1 51								21
22	1 17	1 18	1 20	1 23	1 28	1 33	1 37	1 41	1 45								22
23	1 14	1 15	1 17	1 19	1 24	1 28	1 32	1 36	1 39								23
24	1 11	1 12	1 14	1 16	1 20	1 23	1 27	1 31	1 34	1 37							24
25	1 9	1 10	1 11	1 13	1 16	1 19	1 22	1 26	1 29	1 31							25
26	1 8	1 8	1 9	1 11	1 13	1 16	1 18	1 21	1 24	1 26							26
27	1 7	1 7	1 8	1 9	1 11	1 13	1 15	1 17	1 20	1 22							27
28	1 6	1 6	1 7	1 8	1 9	1 11	1 12	1 14	1 16	1 18	1 20						28
29	1 6	1 6	1 6	1 7	1 8	1 9	1 10	1 11	1 13	1 14	1 16						29
30	1 5	1 5	1 5	1 6	1 7	1 7	1 8	1 9	1 10	1 11	1 13						30
31	1 5	1 5	1 5	1 5	1 6	1 6	1 6	1 7	1 8	1 9	1 10						31
32	1 4	1 4	1 5	1 5	1 5	1 5	1 5	1 5	1 6	1 7	1 8	1 9					32
33	1 4	1 4	1 4	1 4	1 4	1 4	1 4	1 4	1 4	1 5	1 5	1 6					33
34	1 4	1 3	1 3	1 3	1 3	1 3	1 3	1 3	1 3	1 3	1 3	1 3					34
35	1 4	1 3	1 3	1 3	1 2	1 1	1 1	1 1	1 1	1 1	1 1	1 1					35
36	1 4	1 3	1 2	1 2	1 1	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0				36
37	1 4	1 3	1 2	1 1	59	59	59	59	59	59	59	59	58				37
38	1 4	1 3	1 1	1 0	58	58	58	58	58	58	58	58	57				38
39	1 5	1 3	1 1	1 0	58	58	58	58	57	57	57	56	56				39
40	1 5	1 3	1 1	1 0	58	57	57	57	57	56	56	55	54	53			40
41	1 6	1 3	1 1	59	57	56	56	56	56	55	54	53	52	52			41
42	1 6	1 3	1 1	59	57	56	55	55	55	54	53	52	51	51			42
43	1 6	1 3	1 1	59	56	55	54	54	54	53	52	51	50	50	49		43
44	1 6	1 3	1 1	59	56	54	53	53	53	52	51	50	49	49	48		44
46	1 6	1 3	1 1	59	56	54	53	52	51	50	49	48	48	47	47		46
48	1 7	1 3	1 1	59	56	54	52	51	49	48	47	46	46	45	45	45	48
50	1 7	1 3	1 1	59	56	53	51	50	48	47	46	45	45	44	44	44	50
52	1 7	1 3	1 1	59	55	52	50	49	48	47	46	45	44	43	42	42	52
54	1 7	1 3	1 1	59	55	52	50	48	47	46	45	44	43	42	41	41	54
56	1 7	1 3	1 0	58	55	52	49	48	47	46	45	44	43	42	41	40	56
58	1 7	1 3	1 0	58	55	52	49	47	46	45	44	43	42	41	40	39	58
60	1 7	1 3	1 0	58	55	51	48	46	45	44	43	42	41	40	39	38	60
62	1 7	1 3	1 0	58	54	51	48	46	44	43	42	41	40	39	38		62
64	1 7	1 3	1 0	58	54	51	48	46	44	43	42	40	39	38	37		64
66	1 8	1 3	1 0	57	54	50	47	45	43	42	41	39	38	37			66
68	1 8	1 3	1 0	57	54	50	47	45	43	42	40	39	38	37			68
70	1 8	1 3	1 0	57	53	50	47	44	42	41	40	39	38				70
72		1 3	1 0	57	53	50	46	43	41	40	39	38					72
74			1 0	57	52	49	46	43	41	40	39	38					74
76				57	52	48	45	43	41	39	38	37					76
78					51	48	45	42	40	39	37						78
80					51	47	44	42	40	39	37						80
82						47	44	41	40	38							82
84						47	44	41	39	38							84
86							44	41	39								86
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 40°

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	1 16	1 18	1 21	1 25	1 31	1 39	1 47	2 5	2 26	2 48	3 10	3 32	3 54	4 16	4 38	4 59	6
7	1 19	1 16	1 18	1 21	1 24	1 28	1 34	1 48	2 4	2 22	2 40	2 58	3 16	3 34	3 52	4 10	7
8	1 24	1 19	1 16	1 18	1 20	1 22	1 26	1 36	1 50	2 4	2 18	2 33	2 48	3 4	3 20	3 36	8
9	1 31	1 23	1 19	1 16	1 18	1 19	1 21	1 27	1 38	1 49	2 1	2 13	2 25	2 38	2 52	3 5	9
10	1 40	1 29	1 23	1 19	1 16	1 17	1 18	1 21	1 29	1 38	1 48	1 58	2 9	2 20	2 32	2 44	10
11	1 50	1 36	1 28	1 22	1 18	1 15	1 16	1 18	1 23	1 31	1 39	1 48	1 57	2 7	2 17	2 27	11
12	2 1	1 44	1 34	1 26	1 20	1 17	1 15	1 17	1 20	1 26	1 33	1 40	1 48	1 57	2 5	2 13	12
13	2 11	1 52	1 40	1 30	1 23	1 19	1 16	1 16	1 18	1 22	1 28	1 34	1 41	1 48	1 55	2 2	13
14	2 21	2 0	1 46	1 34	1 26	1 21	1 17	1 15	1 17	1 19	1 23	1 28	1 34	1 40	1 46	1 53	14
15	2 31	2 8	1 52	1 39	1 30	1 23	1 19	1 16	1 15	1 17	1 20	1 23	1 27	1 32	1 38	1 44	15
16	2 41	2 16	1 58	1 44	1 34	1 26	1 21	1 17	1 14	1 15	1 17	1 19	1 22	1 26	1 31	1 37	16
17	2 52	2 24	2 4	1 49	1 38	1 30	1 24	1 19	1 15	1 14	1 15	1 17	1 19	1 22	1 26	1 31	17
18	3 3	2 32	2 11	1 54	1 43	1 34	1 28	1 21	1 16	1 13	1 14	1 15	1 17	1 19	1 22	1 26	18
19	3 14	2 41	2 18	2 0	1 48	1 39	1 32	1 23	1 17	1 14	1 13	1 14	1 15	1 17	1 19	1 22	19
20	3 25	2 50	2 25	2 6	1 53	1 43	1 36	1 25	1 19	1 15	1 12	1 12	1 13	1 15	1 16	1 19	20
21	3 36	2 59	2 32	2 12	1 58	1 47	1 39	1 27	1 20	1 16	1 13	1 11	1 12	1 13	1 14	1 16	21
22	3 47	3 8	2 40	2 18	2 4	1 52	1 43	1 30	1 22	1 17	1 13	1 11	1 11	1 12	1 13	1 14	22
23	3 58	3 17	2 48	2 25	2 10	1 57	1 47	1 33	1 24	1 18	1 14	1 12	1 10	1 10	1 11	1 12	23
24	4 9	3 26	2 56	2 32	2 15	2 2	1 51	1 37	1 26	1 19	1 15	1 12	1 9	1 9	1 9	1 10	24
25	4 20	3 35	3 4	2 39	2 21	2 7	1 56	1 40	1 28	1 21	1 16	1 13	1 10	1 8	1 8	1 9	25
26	4 30	3 44	3 12	2 45	2 27	2 12	2 0	1 43	1 30	1 22	1 17	1 13	1 10	1 8	1 8	1 9	26
27	4 41	3 53	3 20	2 52	2 33	2 17	2 4	1 47	1 33	1 24	1 18	1 14	1 11	1 8	1 7	1 8	27
28	4 51	4 2	3 28	2 59	2 39	2 23	2 8	1 50	1 35	1 25	1 19	1 14	1 11	1 8	1 7	1 7	28
29	5 1	4 11	3 36	3 6	2 45	2 28	2 12	1 53	1 38	1 27	1 20	1 15	1 12	1 9	1 7	1 7	29
30	5 12	4 20	3 44	3 13	2 50	2 33	2 17	1 56	1 40	1 29	1 21	1 15	1 12	1 9	1 7	1 6	30
31	5 23	4 29	3 52	3 20	2 56	2 38	2 21	2 0	1 43	1 30	1 22	1 16	1 12	1 9	1 7	1 6	31
32	5 33	4 38	3 59	3 27	3 1	2 43	2 26	2 3	1 45	1 32	1 23	1 17	1 13	1 10	1 7	1 6	32
33	5 43	4 46	4 6	3 33	3 7	2 48	2 30	2 6	1 47	1 34	1 24	1 18	1 14	1 10	1 8	1 6	33
34	5 52	4 54	4 13	3 39	3 13	2 53	2 34	2 9	1 49	1 36	1 26	1 19	1 15	1 11	1 8	1 6	34
35	6 1	5 2	4 20	3 45	3 19	2 58	2 38	2 12	1 51	1 38	1 27	1 20	1 15	1 11	1 8	1 6	35
36	6 10	5 10	4 26	3 51	3 24	3 2	2 42	2 15	1 54	1 40	1 29	1 22	1 16	1 12	1 8	1 6	36
37	6 18	5 17	4 32	3 57	3 29	3 7	2 46	2 18	1 57	1 42	1 31	1 23	1 17	1 12	1 9	1 7	37
38	6 26	5 24	4 38	4 3	3 33	3 11	2 50	2 21	2 0	1 44	1 33	1 25	1 18	1 13	1 9	1 7	38
39	6 34	5 31	4 44	4 8	3 38	3 15	2 54	2 24	2 2	1 46	1 35	1 26	1 19	1 14	1 10	1 7	39
40	6 42	5 38	4 50	4 13	3 42	3 19	2 58	2 27	2 5	1 48	1 37	1 28	1 20	1 14	1 10	1 7	40
41	6 50	5 45	4 56	4 19	3 47	3 24	3 2	2 30	2 8	1 51	1 39	1 29	1 21	1 15	1 11	1 8	41
42	6 58	5 52	5 2	4 24	3 51	3 28	3 6	2 33	2 10	1 53	1 41	1 30	1 22	1 16	1 11	1 8	42
43	7 7	5 59	5 8	4 29	3 56	3 32	3 10	2 36	2 13	1 55	1 43	1 32	1 23	1 17	1 12	1 9	43
44	7 16	6 6	5 14	4 34	4 0	3 36	3 13	2 39	2 15	1 57	1 44	1 33	1 24	1 18	1 13	1 9	44
46	7 33	6 21	5 26	4 44	4 9	3 44	3 20	2 44	2 19	2 1	1 47	1 35	1 27	1 20	1 14	1 10	46
48	7 50	6 35	5 38	4 54	4 18	3 51	3 27	2 49	2 23	2 5	1 50	1 37	1 29	1 22	1 15	1 11	48
50			5 50	5 3	4 27	3 58	3 33	2 54	2 27	2 8	1 52	1 39	1 31	1 23	1 17	1 12	50
52					4 36	4 5	3 39	2 59	2 31	2 11	1 54	1 42	1 32	1 24	1 18	1 13	52
54							3 45	3 4	2 35	2 14	1 56	1 44	1 34	1 26	1 19	1 14	54
56								3 9	2 39	2 17	1 58	1 46	1 36	1 28	1 20	1 14	56
58									2 43	2 19	2 0	1 48	1 37	1 29	1 21	1 15	58
60										2 21	2 2	1 49	1 38	1 30	1 22	1 15	60
62											2 4	1 50	1 39	1 30	1 22	1 16	62
64												1 51	1 40	1 31	1 23	1 16	64
66													1 40	1 31	1 24	1 17	66
68														1 31	1 24	1 17	68
70															1 24	1 17	70
72																1 17	72
																	74
																	76
																	78
																	80
																	82
																	84
																	86
						11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE P. EFFECT OF SUN'S PAR.

Add the Numbers above the lines to 3rd Correction, subtract the others.

☽'s App Alt.	Sun's Apparen. Altitude.									
	5	10	20	30	40	50	60	70	80	90
	″	″	″	″	″	″	″	″	″	″
5	0	1	2	4	6					
10	1	0	1	3	4	6				
20	4	3	1	1	2	3	4			
30	6	5	3	2	0	1	2	3		
40	8	7	5	4	2	1	0	1	2	
50		9	7	5	4	2	1	0	0	0
60			9	7	5	4	3	2	2	
70				8	6	5	4	3		
80					7	6	4			
90						6				

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 40°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	5 19	5 39	5 59	6 19	6 57	7 33											6
7	4 27	4 44	5 1	5 18	5 51	6 20											7
8	3 51	4 6	4 20	4 34	5 1	5 26	5 50										8
9	3 20	3 34	3 46	3 58	4 22	4 44	5 5										9
10	2 56	3 8	3 19	3 30	3 50	4 9	4 27										10
11	2 37	2 47	2 57	3 6	3 25	3 42	3 58										11
12	2 22	2 30	2 39	2 48	3 5	3 20	3 33	3 46									12
13	2 10	2 17	2 25	2 32	2 47	3 1	3 13	3 25									13
14	2 0	2 6	2 12	2 18	2 32	2 44	2 55	3 4									14
15	1 50	1 56	2 1	2 7	2 19	2 30	2 40	2 48									15
16	1 42	1 47	1 52	1 58	2 8	2 18	2 27	2 35	2 42								16
17	1 36	1 40	1 45	1 50	1 59	2 8	2 16	2 23	2 30								17
18	1 31	1 34	1 38	1 43	1 51	1 59	2 6	2 12	2 19								18
19	1 26	1 29	1 33	1 36	1 44	1 51	1 58	2 3	2 9								19
20	1 22	1 21	1 27	1 30	1 37	1 44	1 50	1 55	2 0	2 5							20
21	1 18	1 20	1 23	1 26	1 32	1 38	1 44	1 49	1 53	1 57							21
22	1 15	1 17	1 19	1 22	1 28	1 33	1 38	1 43	1 47	1 50							22
23	1 13	1 14	1 16	1 19	1 24	1 29	1 33	1 38	1 42	1 45							23
24	1 11	1 12	1 14	1 16	1 21	1 25	1 29	1 33	1 37	1 40	1 43						24
25	1 10	1 11	1 12	1 14	1 18	1 21	1 25	1 29	1 32	1 35	1 37						25
26	1 9	1 10	1 11	1 12	1 15	1 18	1 21	1 25	1 28	1 30	1 32						26
27	1 8	1 9	1 9	1 10	1 13	1 15	1 18	1 21	1 24	1 26	1 27						27
28	1 7	1 8	1 8	1 9	1 11	1 13	1 16	1 18	1 20	1 22	1 23	1 24					28
29	1 7	1 7	1 7	1 8	1 9	1 11	1 13	1 15	1 16	1 18	1 19	1 20					29
30	1 6	1 6	1 6	1 7	1 8	1 9	1 11	1 12	1 13	1 15	1 16	1 17					30
31	1 6	1 6	1 6	1 7	1 7	1 8	1 9	1 10	1 11	1 13	1 14	1 15					31
32	1 6	1 6	1 6	1 6	1 6	1 6	1 7	1 8	1 9	1 10	1 11	1 12	1 13				32
33	1 5	1 5	1 5	1 5	1 5	1 5	1 6	1 6	1 7	1 8	1 9	1 10	1 10				33
34	1 5	1 4	1 4	1 4	1 4	1 4	1 5	1 5	1 6	1 7	1 7	1 8	1 8				34
35	1 5	1 4	1 4	1 4	1 4	1 4	1 4	1 4	1 4	1 5	1 5	1 6	1 6				35
36	1 5	1 4	1 3	1 3	1 3	1 3	1 3	1 3	1 3	1 4	1 4	1 4	1 4	1 4			36
37	1 5	1 4	1 3	1 2	1 2	1 2	1 2	1 1	1 1	1 2	1 2	1 2	1 2	1 2			37
38	1 5	1 4	1 2	1 1	1 1	1 1	1 1	1 0	1 0	1 0	1 0	1 1	1 1	1 1			38
39	1 5	1 4	1 2	1 1	1 0	1 0	1 0	59	59	59	59	59	59	59			39
40	1 5	1 4	1 2	1 1	1 0	59	59	58	58	57	57	57	57	57	57		40
41	1 6	1 4	1 2	1 1	59	58	58	57	57	56	56	56	56	56	56		41
42	1 6	1 4	1 2	1 0	58	57	57	56	56	55	55	55	55	55	55		42
43	1 6	1 4	1 2	1 0	58	57	56	55	55	54	54	54	54	54	54	54	43
44	1 6	1 4	1 2	1 0	58	56	55	54	54	53	53	53	53	53	53	53	44
46	1 7	1 4	1 2	1 0	58	56	54	53	53	52	52	51	51	51	51	51	46
48	1 8	1 5	1 2	1 0	58	55	53	52	52	51	51	50	49	49	49	49	48
50	1 8	1 5	1 2	1 0	57	54	52	51	51	50	49	48	48	48	48	48	50
52	1 9	1 5	1 2	1 0	57	54	52	50	50	49	48	47	47	46	46	46	52
54	1 9	1 5	1 2	1 0	57	54	51	49	49	48	47	46	46	45	45	45	54
56	1 10	1 6	1 3	1 0	56	53	51	49	48	47	46	45	45	44	44	44	56
58	1 10	1 6	1 3	1 0	56	53	50	48	47	46	45	45	44	43	43		58
60	1 10	1 7	1 4	1 1	56	52	50	48	47	45	44	44	43	42	42		60
62	1 11	1 7	1 4	1 1	56	52	50	48	46	45	44	43	42	42			62
64	1 11	1 7	1 4	1 1	56	52	49	47	45	44	43	42	41	41			64
66	1 12	1 7	1 4	1 1	56	52	49	47	45	43	42	42	41				66
68	1 12	1 8	1 4	1 1	56	52	49	47	45	43	42	42	41				68
70	1 12	1 8	1 4	1 1	55	51	48	46	44	43	42	42					70
72	1 13	1 8	1 4	1 1	55	51	48	46	44	43	42	41					72
74	1 13	1 8	1 4	1 1	55	51	48	46	44	43	42						74
76		1 8	1 4	1 1	55	51	48	46	44	42	41						76
78			1 4	1 1	55	51	48	46	43	42							78
80				1 1	55	51	48	46	43	41							80
82					55	51	48	46	43								82
81					55	51	48	46	43								84
86						51	48	45									86
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 44°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	1 16	1 18	1 21	1 25	1 31	1 37	1 45	2 3	2 23	2 44	3 5	3 25	3 45	4 5	4 25	4 44	6
7	1 20	1 16	1 18	1 20	1 24	1 28	1 33	1 46	2 1	2 17	2 34	2 51	3 8	3 25	3 42	3 59	7
8	1 25	1 19	1 16	1 17	1 19	1 22	1 25	1 35	1 47	2 0	2 14	2 29	2 43	2 58	3 12	3 27	8
9	1 31	1 23	1 18	1 15	1 16	1 18	1 21	1 27	1 36	1 47	1 59	2 12	2 24	2 36	2 48	3 0	9
10	1 39	1 28	1 21	1 17	1 15	1 16	1 18	1 22	1 29	1 38	1 48	1 58	2 8	2 18	2 29	2 39	10
11	1 48	1 34	1 25	1 20	1 17	1 15	1 16	1 19	1 24	1 31	1 39	1 47	1 56	2 5	2 14	2 24	11
12	1 58	1 41	1 30	1 23	1 19	1 16	1 15	1 17	1 20	1 25	1 32	1 38	1 46	1 54	2 2	2 11	12
13	2 8	1 48	1 35	1 27	1 22	1 18	1 16	1 15	1 17	1 21	1 26	1 32	1 38	1 45	1 52	1 59	13
14	2 18	1 56	1 41	1 31	1 25	1 20	1 17	1 14	1 15	1 18	1 22	1 27	1 32	1 38	1 44	1 49	14
15	2 28	2 4	1 47	1 36	1 29	1 23	1 19	1 15	1 14	1 16	1 19	1 23	1 27	1 32	1 37	1 42	15
16	2 38	2 12	1 53	1 41	1 33	1 26	1 21	1 17	1 14	1 15	1 17	1 20	1 23	1 27	1 32	1 36	16
17	2 48	2 20	2 0	1 47	1 37	1 30	1 24	1 19	1 15	1 15	1 16	1 18	1 20	1 23	1 26	1 30	17
18	2 58	2 28	2 8	1 53	1 42	1 34	1 27	1 20	1 16	1 14	1 15	1 16	1 18	1 20	1 22	1 25	18
19	3 8	2 37	2 15	1 59	1 47	1 38	1 30	1 22	1 17	1 14	1 14	1 15	1 16	1 17	1 19	1 22	19
20	3 18	2 45	2 22	2 5	1 52	1 42	1 34	1 25	1 19	1 15	1 13	1 14	1 14	1 15	1 17	1 19	20
21	3 29	2 54	2 30	2 12	1 57	1 46	1 37	1 27	1 21	1 17	1 14	1 12	1 13	1 14	1 15	1 17	21
22	3 39	3 2	2 37	2 18	2 3	1 51	1 41	1 30	1 23	1 18	1 14	1 11	1 12	1 13	1 14	1 16	22
23	3 49	3 11	2 45	2 24	2 8	1 55	1 45	1 33	1 25	1 19	1 15	1 12	1 11	1 12	1 13	1 14	23
24	4 0	3 19	2 52	2 31	2 14	2 0	1 49	1 36	1 27	1 20	1 16	1 12	1 10	1 10	1 11	1 13	24
25	4 10	3 28	2 59	2 37	2 20	2 5	1 53	1 39	1 29	1 21	1 17	1 13	1 10	1 9	1 10	1 11	25
26	4 20	3 36	3 6	2 43	2 25	2 10	1 57	1 42	1 31	1 22	1 17	1 13	1 10	1 8	1 9	1 9	26
27	4 30	3 45	3 13	2 49	2 31	2 15	2 1	1 45	1 32	1 23	1 18	1 14	1 11	1 9	1 8	1 8	27
28	4 39	3 53	3 20	2 55	2 36	2 20	2 5	1 47	1 34	1 25	1 19	1 15	1 12	1 9	1 7	1 7	28
29	4 48	4 1	3 27	3 1	2 41	2 24	2 9	1 49	1 36	1 27	1 20	1 15	1 12	1 9	1 7	1 6	29
30	4 57	4 9	3 34	3 7	2 46	2 29	2 14	1 52	1 38	1 28	1 21	1 16	1 13	1 9	1 7	1 6	30
31	5 7	4 17	3 41	3 13	2 51	2 34	2 19	1 55	1 40	1 30	1 22	1 17	1 13	1 10	1 8	1 6	31
32	5 16	4 25	3 48	3 19	2 56	2 38	2 23	1 58	1 42	1 31	1 23	1 18	1 14	1 10	1 8	1 6	32
33	5 25	4 33	3 54	3 25	3 1	2 43	2 27	2 1	1 44	1 33	1 24	1 19	1 15	1 11	1 9	1 7	33
34	5 34	4 40	4 1	3 30	3 6	2 47	2 31	2 4	1 47	1 35	1 26	1 20	1 15	1 11	1 9	1 7	34
35	5 43	4 48	4 8	3 36	3 11	2 52	2 35	2 7	1 50	1 37	1 27	1 21	1 16	1 12	1 9	1 7	35
36	5 51	4 55	4 14	3 42	3 15	2 56	2 39	2 11	1 53	1 39	1 28	1 22	1 17	1 13	1 10	1 7	36
37	6 0	5 3	4 21	3 47	3 20	3 0	2 43	2 15	1 56	1 41	1 30	1 23	1 17	1 13	1 10	1 8	37
38	6 9	5 10	4 27	3 52	3 24	3 4	2 47	2 18	1 58	1 43	1 32	1 24	1 18	1 14	1 11	1 8	38
39	6 18	5 18	4 33	3 58	3 29	3 8	2 51	2 21	2 1	1 45	1 33	1 25	1 19	1 14	1 11	1 8	39
40	6 27	5 25	4 39	4 3	3 33	3 12	2 54	2 24	2 3	1 46	1 35	1 26	1 20	1 15	1 11	1 8	40
41	6 36	5 32	4 45	4 8	3 38	3 16	2 58	2 27	2 6	1 48	1 37	1 27	1 21	1 16	1 12	1 9	41
42	6 45	5 39	4 51	4 13	3 42	3 20	3 1	2 30	2 8	1 50	1 39	1 29	1 22	1 16	1 12	1 9	42
43	6 53	5 46	4 57	4 18	3 47	3 24	3 4	2 33	2 10	1 52	1 40	1 30	1 23	1 17	1 13	1 9	43
44	7 0	5 53	5 5	4 23	3 51	3 28	3 7	2 35	2 12	1 54	1 42	1 32	1 24	1 18	1 13	1 10	44
46	7 14	6 6	5 14	4 33	4 0	3 35	3 14	2 40	2 17	1 58	1 45	1 35	1 26	1 20	1 14	1 10	46
48	7 27	6 18	5 25	4 43	4 9	3 43	3 21	2 45	2 21	2 2	1 48	1 37	1 28	1 21	1 15	1 11	48
50	7 40	6 29	5 35	4 52	4 18	3 50	3 27	2 50	2 25	2 6	1 52	1 40	1 31	1 23	1 16	1 11	50
52	7 52	6 40	5 45	5 1	4 26	3 57	3 33	2 55	2 29	2 10	1 56	1 43	1 33	1 25	1 18	1 12	52
54			5 55	5 9	4 34	4 4	3 39	3 0	2 33	2 14	1 59	1 46	1 35	1 26	1 19	1 13	54
56					4 42	4 10	3 45	3 5	2 37	2 17	2 2	1 49	1 37	1 27	1 20	1 14	56
							3 50	3 10	2 41	2 20	2 4	1 51	1 39	1 29	1 21	1 15	58
								3 14	2 44	2 22	2 5	1 52	1 40	1 30	1 22	1 16	60
									2 47	2 24	2 6	1 53	1 42	1 31	1 23	1 17	62
										2 26	2 7	1 54	1 43	1 32	1 24	1 18	64
											2 8	1 55	1 44	1 33	1 25	1 19	66
												1 56	1 45	1 34	1 26	1 20	68
													1 45	1 35	1 27	1 21	70
														1 36	1 29	1 22	72
															1 30	1 22	74
																1 23	76
																	78
																	80
																	82
																	84
																	86
						11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE *P*. EFFECT OF SUN'S PAR.

Add the Numbers above the lines to 3rd Correction, subtract the others.

☽'s App Alt.	Sun's Apparent Altitude.									
	5	10	20	30	40	50	60	70	80	90
	″	″	″	″	″	″	″	″	″	″
5	0	1	2	4	5	6				
10	1	0	1	2	4	5				
20	3	3	1	0	2	3	4			
30	5	5	3	2	0	1	2	2		
40	7	7	5	4	2	1	0	0	1	
50	9	8	7	5	4	3	2	1	1	
60			8	7	5	4	3	2	2	
70				8	6	5	4	3		
80					7	6				

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 44°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	5 3	5 22	5 41	5 59	6 36	7 10	7 40										6
7	4 15	4 31	4 47	5 2	5 33	6 1	6 29										7
8	3 40	3 53	4 6	4 20	4 46	5 11	5 35	5 58									8
9	3 12	3 24	3 35	3 47	4 10	4 31	4 51	5 10									9
10	2 50	3 0	3 10	3 20	3 39	3 58	4 17	4 34									10
11	2 33	2 42	2 52	3 0	3 17	3 33	3 48	4 3									11
12	2 19	2 27	2 36	2 44	2 59	3 13	3 26	3 39	3 51								12
13	2 6	2 13	2 21	2 29	2 43	2 56	3 9	3 20	3 29								13
14	1 55	2 2	2 9	2 16	2 29	2 41	2 53	3 2	3 10								14
15	1 47	1 53	1 59	2 5	2 17	2 28	2 38	2 47	2 54								15
16	1 40	1 45	1 50	1 56	2 7	2 17	2 26	2 34	2 41	2 47							16
17	1 34	1 38	1 43	1 48	1 58	2 7	2 15	2 22	2 29	2 35							17
18	1 29	1 33	1 37	1 42	1 51	1 59	2 6	2 12	2 18	2 24							18
19	1 25	1 28	1 32	1 36	1 44	1 52	1 59	2 4	2 9	2 14							19
20	1 22	1 25	1 28	1 31	1 38	1 46	1 52	1 57	2 1	2 6	2 11						20
21	1 19	1 22	1 25	1 27	1 33	1 40	1 46	1 51	1 55	1 59	2 2						21
22	1 17	1 19	1 22	1 24	1 29	1 35	1 40	1 45	1 49	1 53	1 55						22
23	1 15	1 17	1 19	1 21	1 25	1 30	1 35	1 40	1 44	1 47	1 49						23
24	1 14	1 15	1 16	1 18	1 22	1 26	1 30	1 35	1 39	1 42	1 44	1 46					24
25	1 12	1 13	1 14	1 16	1 19	1 22	1 26	1 30	1 34	1 37	1 39	1 40					25
26	1 10	1 11	1 12	1 14	1 16	1 19	1 22	1 26	1 30	1 32	1 34	1 35					26
27	1 9	1 10	1 11	1 12	1 14	1 16	1 19	1 23	1 26	1 28	1 30	1 31					27
28	1 8	1 9	1 10	1 11	1 12	1 14	1 17	1 20	1 22	1 24	1 26	1 27	1 28				28
29	1 7	1 8	1 8	1 9	1 10	1 12	1 15	1 17	1 19	1 21	1 22	1 23	1 25				29
30	1 6	1 7	1 7	1 8	1 9	1 10	1 12	1 14	1 16	1 18	1 19	1 20	1 22				30
31	1 6	1 6	1 6	1 7	1 8	1 8	1 10	1 12	1 14	1 15	1 17	1 18	1 19				31
32	1 5	1 6	1 6	1 6	1 7	1 7	1 8	1 10	1 12	1 13	1 14	1 15	1 16	1 17			32
33	1 5	1 5	1 5	1 5	1 6	1 6	1 7	1 8	1 9	1 10	1 11	1 12	1 13	1 14			33
34	1 5	1 4	1 4	1 4	1 5	1 5	1 6	1 6	1 7	1 8	1 9	1 10	1 11	1 12			34
35	1 5	1 4	1 4	1 4	1 4	1 4	1 5	1 5	1 5	1 6	1 7	1 8	1 9	1 10			35
36	1 5	1 4	1 3	1 3	1 3	1 3	1 4	1 4	1 4	1 5	1 5	1 6	1 7	1 8	1 9		36
37	1 6	1 4	1 3	1 2	1 2	1 2	1 3	1 3	1 3	1 4	1 4	1 5	1 5	1 6	1 7		37
38	1 6	1 4	1 2	1 1	1 1	1 1	1 2	1 2	1 2	1 3	1 3	1 4	1 4	1 4	1 5		38
39	1 6	1 4	1 2	1 1	1 0	1 0	1 1	1 1	1 1	1 2	1 2	1 3	1 3	1 3	1 4		39
40	1 6	1 4	1 2	1 1	1 0	1 0	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 2	1 3	40
41	1 7	1 5	1 3	1 1	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 1	41
42	1 7	1 5	1 3	1 1	59	59	59	59	59	59	59	59	59	59	59	59	42
43	1 7	1 5	1 3	1 1	59	59	58	58	58	58	58	58	58	58	58	58	43
44	1 7	1 5	1 3	1 1	59	58	57	57	57	57	57	57	57	57	57	57	44
46	1 7	1 5	1 3	1 1	59	57	56	56	56	56	55	55	55	55	55	55	46
48	1 8	1 6	1 4	1 2	59	57	55	55	55	54	54	54	53	53	53	53	48
50	1 8	1 6	1 4	1 2	59	57	55	54	54	53	53	53	52	52	52	52	50
52	1 9	1 6	1 4	1 2	59	56	54	53	53	52	52	51	51	51	50	51	52
54	1 10	1 7	1 4	1 2	59	56	54	53	52	51	51	50	50	49	49		54
56	1 10	1 7	1 5	1 2	59	56	54	52	51	50	50	49	49	48	47		56
58	1 11	1 8	1 5	1 3	59	56	53	51	50	49	49	48	48	47			58
60	1 11	1 8	1 5	1 3	59	56	53	51	50	49	48	47	47	46			60
62	1 12	1 9	1 6	1 3	59	56	53	51	49	48	47	47	46				62
64	1 13	1 9	1 6	1 3	59	56	53	51	49	48	47	46	45				64
66	1 14	1 10	1 7	1 4	59	56	53	51	49	48	47	46					66
68	1 15	1 11	1 7	1 4	59	56	53	51	49	47	46	45					68
70	1 16	1 11	1 7	1 4	59	55	53	51	49	47	46						70
72	1 16	1 12	1 8	1 4	59	55	52	50	48	46	45						72
74	1 16	1 12	1 8	1 4	59	55	52	50	48	46							74
76	1 17	1 12	1 8	1 5	59	55	52	49	47	46							76
78	1 17	1 12	1 8	1 5	59	55	52	49	47								78
80		1 12	1 8	1 5	59	55	52	49	47								80
82			1 8	1 5	59	55	52	49									82
84				1 5	59	55	52	49									84
86					59	55	52										86
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	

TABLE XVIII

THIRD CORRECTION, to APPARENT DISTANCE 48°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	1 16	1 17	1 19	1 23	1 29	1 36	1 43	2 1	2 20	2 39	2 58	3 16	3 35	3 54	4 13	4 32	6
7	1 19	1 16	1 17	1 19	1 23	1 28	1 33	1 46	2 0	2 16	2 32	2 47	3 2	3 18	3 34	3 50	7
8	1 24	1 19	1 16	1 17	1 19	1 22	1 26	1 35	1 47	1 59	2 12	2 25	2 39	2 53	3 7	3 21	8
9	1 30	1 23	1 18	1 16	1 17	1 19	1 21	1 28	1 37	1 47	1 58	2 9	2 20	2 32	2 44	2 55	9
10	1 37	1 27	1 21	1 18	1 16	1 17	1 18	1 23	1 30	1 38	1 47	1 56	2 6	2 16	2 26	2 36	10
11	1 45	1 33	1 25	1 21	1 18	1 16	1 17	1 20	1 25	1 32	1 39	1 47	1 55	2 4	2 13	2 22	11
12	1 53	1 39	1 30	1 24	1 21	1 18	1 16	1 19	1 22	1 27	1 33	1 40	1 47	1 54	2 2	2 10	12
13	2 2	1 46	1 36	1 28	1 24	1 20	1 18	1 17	1 19	1 23	1 28	1 34	1 40	1 46	1 53	2 0	13
14	2 11	1 54	1 42	1 33	1 27	1 23	1 20	1 16	1 17	1 20	1 24	1 29	1 34	1 39	1 45	1 51	14
15	2 20	2 1	1 48	1 37	1 30	1 26	1 22	1 17	1 16	1 18	1 21	1 24	1 29	1 33	1 38	1 43	15
16	2 30	2 9	1 54	1 42	1 34	1 29	1 24	1 18	1 16	1 17	1 18	1 20	1 24	1 28	1 32	1 37	16
17	2 40	2 17	2 0	1 47	1 38	1 32	1 27	1 20	1 17	1 16	1 17	1 18	1 21	1 25	1 28	1 32	17
18	2 50	2 25	2 7	1 52	1 42	1 35	1 30	1 22	1 18	1 15	1 16	1 17	1 19	1 22	1 25	1 28	18
19	3 0	2 32	2 14	1 58	1 46	1 39	1 33	1 24	1 19	1 16	1 15	1 16	1 17	1 19	1 22	1 24	19
20	3 9	2 40	2 20	2 3	1 51	1 43	1 36	1 27	1 21	1 17	1 14	1 15	1 16	1 17	1 19	1 21	20
21	3 18	2 48	2 26	2 9	1 56	1 47	1 40	1 30	1 23	1 18	1 15	1 14	1 15	1 16	1 17	1 19	21
22	3 27	2 56	2 33	2 15	2 2	1 52	1 43	1 32	1 24	1 19	1 16	1 13	1 14	1 15	1 16	1 18	22
23	3 37	3 3	2 40	2 21	2 7	1 56	1 46	1 35	1 26	1 20	1 16	1 14	1 13	1 14	1 15	1 16	23
24	3 46	3 11	2 47	2 26	2 12	2 0	1 50	1 37	1 27	1 21	1 17	1 14	1 12	1 13	1 13	1 14	24
25	3 56	3 19	2 54	2 32	2 17	2 5	1 54	1 40	1 29	1 22	1 18	1 15	1 13	1 12	1 12	1 13	25
26	4 5	3 27	3 1	2 38	2 22	2 9	1 58	1 42	1 31	1 24	1 19	1 16	1 13	1 11	1 11	1 12	26
27	4 15	3 34	3 8	2 44	2 27	2 14	2 2	1 44	1 33	1 25	1 20	1 16	1 13	1 11	1 10	1 11	27
28	4 24	3 42	3 15	2 50	2 32	2 18	2 6	1 47	1 35	1 27	1 21	1 17	1 14	1 12	1 10	1 10	28
29	4 33	3 50	3 21	2 56	2 37	2 23	2 10	1 50	1 37	1 28	1 22	1 18	1 15	1 12	1 10	1 9	29
30	4 42	3 58	3 28	3 2	2 42	2 27	2 13	1 53	1 40	1 30	1 23	1 19	1 15	1 12	1 10	1 9	30
31	4 51	4 6	3 35	3 8	2 47	2 31	2 17	1 57	1 42	1 32	1 25	1 20	1 16	1 13	1 11	1 9	31
32	5 0	4 13	3 42	3 14	2 52	2 35	2 20	2 0	1 44	1 33	1 26	1 21	1 16	1 13	1 11	1 9	32
33	5 9	4 21	3 49	3 20	2 57	2 39	2 23	2 3	1 46	1 35	1 27	1 22	1 17	1 14	1 12	1 10	33
34	5 18	4 28	3 55	3 25	3 2	2 44	2 27	2 6	1 49	1 37	1 28	1 23	1 18	1 14	1 12	1 10	34
35	5 27	4 36	4 1	3 31	3 7	2 48	2 31	2 9	1 52	1 39	1 30	1 24	1 19	1 15	1 12	1 10	35
36	5 35	4 43	4 8	3 37	3 12	2 52	2 35	2 12	1 54	1 41	1 31	1 25	1 19	1 15	1 12	1 10	36
37	5 44	4 50	4 14	3 42	3 17	2 57	2 39	2 16	1 56	1 43	1 33	1 26	1 20	1 16	1 13	1 11	37
38	5 52	4 57	4 20	3 47	3 22	3 1	2 43	2 19	1 59	1 45	1 34	1 27	1 21	1 17	1 14	1 11	38
39	6 0	5 4	4 26	3 53	3 26	3 5	2 47	2 22	2 2	1 47	1 35	1 28	1 22	1 17	1 14	1 11	39
40	6 8	5 11	4 32	3 58	3 30	3 10	2 51	2 25	2 5	1 49	1 37	1 29	1 23	1 18	1 15	1 12	40
41	6 16	5 18	4 38	4 3	3 35	3 14	2 55	2 28	2 7	1 51	1 39	1 31	1 24	1 19	1 16	1 13	41
42	6 24	5 24	4 44	4 8	3 40	3 18	2 58	2 31	2 10	1 53	1 41	1 33	1 26	1 20	1 16	1 13	42
43	6 32	5 31	4 50	4 13	3 44	3 22	3 2	2 33	2 12	1 55	1 43	1 34	1 27	1 21	1 17	1 14	43
44	6 39	5 37	4 55	4 18	3 48	3 26	3 5	2 36	2 14	1 57	1 45	1 36	1 28	1 22	1 18	1 15	44
46	6 53	5 49	5 5	4 28	3 56	3 34	3 12	2 41	2 18	2 1	1 43	1 38	1 30	1 23	1 18	1 15	46
48	7 7	6 1	5 15	4 37	4 4	3 41	3 18	2 46	2 22	2 5	1 51	1 40	1 31	1 24	1 19	1 16	48
50	7 21	6 13	5 25	4 46	4 12	3 47	3 24	2 51	2 26	2 8	1 53	1 42	1 33	1 25	1 20	1 16	50
52	7 34	6 24	5 34	4 54	4 20	3 53	3 30	2 56	2 30	2 12	1 56	1 44	1 35	1 27	1 22	1 17	52
54	7 47	6 35	5 43	5 1	4 27	3 59	3 36	3 1	2 34	2 15	1 59	1 46	1 37	1 29	1 23	1 19	54
56	8 0	6 46	5 51	5 8	4 34	4 5	3 41	3 6	2 38	2 18	2 2	1 49	1 39	1 31	1 25	1 20	56
58			5 59	5 15	4 40	4 11	3 46	3 10	2 42	2 21	2 4	1 51	1 41	1 32	1 26	1 21	58
					4 46	4 16	3 50	3 13	2 45	2 23	2 6	1 53	1 42	1 33	1 27	1 21	60
							3 54	3 15	2 47	2 25	2 8	1 54	1 43	1 34	1 28	1 22	62
								3 17	2 49	2 27	2 10	1 56	1 45	1 35	1 28	1 22	64
									2 51	2 29	2 11	1 57	1 46	1 36	1 29	1 23	66
										2 31	2 12	1 58	1 47	1 37	1 30	1 24	68
											2 13	1 59	1 48	1 38	1 30	1 24	70
												2 0	1 49	1 39	1 31	1 24	72
													1 50	1 40	1 32	1 25	74
														1 41	1 33	1 25	76
															1 33	1 26	78
																1 26	80
																	82
																	84
																	86
						11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE *P*. EFFECT OF SUN's PAR

Add the Numbers above the lines to 3rd Correction, subtract the others.

☽'s App Alt.	Sun's Apparent Altitude.									
	5	10	20	30	40	50	60	70	80	90
	″	″	″	″	″	″	″	″	″	″
5	0	1	2	3	4	5				
10	1	1	1	2	3	4	5			
20	3	3	1	0	1	2	3	3		
30	5	5	3	2	1	0	1	2		
40	7	6	5	4	3	2	1	0	0	0
50	9	8	6	5	4	3	2	2	1	
60		9	8	6	5	4	3	3		
70			9	7	6	5	4			
80				8	7	6				
90					7					

THIRD CORRECTION, to APPARENT DISTANCE 48°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	4 51	5 10	5 28	5 46	6 18	6 49	7 19	7 47									6
7	4 6	4 21	4 36	4 51	5 19	5 45	6 11	6 35									7
8	3 34	3 48	4 1	4 14	4 38	5 1	5 22	5 42	6 1								8
9	3 7	3 19	3 30	3 41	4 3	4 24	4 43	5 0	5 17								9
10	2 47	2 57	3 7	3 17	3 36	3 54	4 11	4 26	4 40								10
11	2 31	2 40	2 49	2 57	3 14	3 30	3 44	3 57	4 10								11
12	2 17	2 25	2 33	2 40	2 55	3 9	3 22	3 34	3 45	3 55							12
13	2 6	2 13	2 20	2 27	2 40	2 52	3 4	3 15	3 25	3 32							13
14	1 57	2 4	2 10	2 16	2 27	2 38	2 49	2 59	3 8	3 15							14
15	1 49	1 55	2 1	2 6	2 16	2 26	2 35	2 44	2 53	3 0							15
16	1 42	1 47	1 52	1 57	2 7	2 15	2 23	2 32	2 40	2 46	2 52						16
17	1 36	1 41	1 45	1 50	1 59	2 6	2 14	2 22	2 29	2 34	2 40						17
18	1 31	1 35	1 39	1 43	1 51	1 59	2 6	2 13	2 19	2 24	2 29						18
19	1 27	1 31	1 34	1 38	1 45	1 52	1 58	2 4	2 10	2 15	2 19						19
20	1 24	1 27	1 30	1 33	1 39	1 45	1 51	1 57	2 2	2 7	2 11	2 15					20
21	1 22	1 24	1 27	1 29	1 34	1 40	1 45	1 51	1 56	2 0	2 4	2 7					21
22	1 20	1 22	1 24	1 26	1 30	1 35	1 40	1 45	1 50	1 54	1 57	1 59					22
23	1 18	1 19	1 21	1 23	1 27	1 31	1 36	1 40	1 45	1 49	1 51	1 53					23
24	1 16	1 17	1 19	1 21	1 25	1 28	1 32	1 36	1 40	1 44	1 46	1 48	1 50				24
25	1 14	1 15	1 16	1 18	1 22	1 25	1 29	1 32	1 36	1 39	1 41	1 43	1 45				25
26	1 12	1 13	1 14	1 16	1 19	1 23	1 26	1 29	1 32	1 34	1 36	1 38	1 40				26
27	1 11	1 12	1 13	1 14	1 17	1 20	1 23	1 26	1 28	1 30	1 32	1 34	1 36				27
28	1 10	1 11	1 12	1 13	1 15	1 18	1 20	1 23	1 25	1 27	1 28	1 30	1 32	1 34			28
29	1 9	1 10	1 11	1 12	1 14	1 16	1 18	1 20	1 22	1 24	1 25	1 27	1 28	1 30			29
30	1 9	1 10	1 10	1 11	1 12	1 14	1 16	1 18	1 19	1 21	1 22	1 24	1 25	1 26			30
31	1 9	1 9	1 9	1 10	1 11	1 12	1 14	1 16	1 17	1 19	1 20	1 21	1 22	1 23			31
32	1 8	1 8	1 8	1 9	1 10	1 11	1 13	1 14	1 15	1 17	1 18	1 19	1 19	1 20	1 21		32
33	1 8	1 7	1 7	1 8	1 9	1 10	1 11	1 12	1 13	1 15	1 16	1 17	1 17	1 17	1 18		33
34	1 8	1 6	1 6	1 7	1 8	1 9	1 10	1 11	1 12	1 13	1 14	1 14	1 15	1 15	1 16		34
35	1 8	1 6	1 5	1 6	1 7	1 8	1 9	1 9	1 10	1 11	1 12	1 12	1 13	1 13	1 14		35
36	1 8	1 6	1 5	1 5	1 5	1 6	1 7	1 7	1 8	1 9	1 10	1 10	1 11	1 11	1 12	1 13	36
37	1 9	1 7	1 5	1 4	1 4	1 5	1 6	1 6	1 7	1 7	1 8	1 8	1 8	1 9	1 10	1 11	37
38	1 9	1 7	1 5	1 3	1 3	1 4	1 5	1 5	1 6	1 6	1 7	1 7	1 8	1 8	1 8	1 9	38
39	1 9	1 7	1 5	1 3	1 3	1 3	1 4	1 4	1 5	1 5	1 6	1 6	1 6	1 7	1 7	1 7	39
40	1 9	1 7	1 5	1 3	1 2	1 2	1 3	1 3	1 4	1 4	1 5	1 5	1 5	1 6	1 6	1 6	40
41	1 10	1 8	1 5	1 3	1 1	1 1	1 2	1 2	1 3	1 3	1 4	1 4	1 4	1 5	1 5	1 5	41
42	1 10	1 8	1 5	1 3	1 1	1 1	1 1	1 2	1 2	1 2	1 3	1 3	1 3	1 4	1 4	1 4	42
43	1 11	1 8	1 6	1 4	1 1	1 0	1 0	1 1	1 1	1 1	1 2	1 2	1 2	1 3	1 3	1 3	43
44	1 12	1 9	1 6	1 4	1 1	1 0	1 0	1 0	1 0	1 0	1 1	1 1	1 1	1 1	1 1	1 1	44
46	1 12	1 9	1 6	1 4	1 1	59	59	59	59	59	59	59	59	59	59	59	46
48	1 13	1 10	1 7	1 4	1 1	59	58	58	58	58	57	57	57	57	57	57	48
50	1 13	1 10	1 7	1 5	1 1	59	57	57	57	57	56	56	56	56	56		50
52	1 14	1 11	1 8	1 5	1 1	59	57	56	56	56	55	55	54	54	54		52
54	1 15	1 11	1 8	1 6	1 2	59	57	56	55	55	54	54	53	53			54
56	1 15	1 11	1 8	1 6	1 2	59	57	55	54	54	53	53	52	52			56
58	1 16	1 12	1 9	1 6	1 2	59	57	55	54	53	52	52	51				58
60	1 16	1 12	1 9	1 6	1 2	59	57	55	53	52	52	51	50				60
62	1 17	1 13	1 10	1 7	1 2	59	57	55	53	52	51	51					62
64	1 17	1 13	1 10	1 7	1 2	59	57	55	53	52	51	50					64
66	1 18	1 14	1 10	1 7	1 3	59	57	54	52	51	50						66
68	1 18	1 14	1 10	1 7	1 3	59	56	54	52	51	50						68
70	1 19	1 15	1 11	1 8	1 3	59	56	54	52	51							70
72	1 19	1 15	1 11	1 8	1 3	59	56	54	52	50							72
74	1 20	1 15	1 11	1 8	1 3	59	56	53	51								74
76	1 20	1 16	1 12	1 8	1 3	59	56	53	51								76
78	1 21	1 16	1 12	1 9	1 4	59	56	53									78
80	1 21	1 16	1 12	1 9	1 4	59	56	53									80
82	1 21	1 16	1 12	1 9	1 4	59	56										82
84		1 16	1 12	1 9	1 4	59	56										84
86			1 12	1 9	1 4	59											86
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	

TABLE XVIII.

Third Correction to Apparent Distance 52°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	1 18	1 19	1 21	1 24	1 30	1 37	1 44	2 0	2 17	2 34	2 51	3 10	3 28	3 47	4 6	4 24	6
7	1 21	1 18	1 19	1 21	1 24	1 29	1 34	1 46	2 0	2 14	2 28	2 42	2 57	3 12	3 27	3 43	7
8	1 25	1 21	1 18	1 19	1 21	1 24	1 27	1 36	1 47	1 58	2 11	2 23	2 36	2 50	3 3	3 16	8
9	1 30	1 24	1 20	1 18	1 19	1 21	1 23	1 29	1 37	1 47	1 57	2 8	2 19	2 31	2 42	2 53	9
10	1 37	1 28	1 23	1 20	1 18	1 19	1 21	1 25	1 30	1 38	1 46	1 56	2 6	2 16	2 26	2 36	10
11	1 45	1 34	1 28	1 23	1 20	1 18	1 19	1 22	1 26	1 32	1 39	1 47	1 56	2 4	2 13	2 22	11
12	1 54	1 41	1 33	1 27	1 22	1 20	1 18	1 20	1 23	1 27	1 33	1 40	1 47	1 54	2 2	2 10	12
13	2 2	1 48	1 38	1 31	1 25	1 22	1 19	1 19	1 21	1 24	1 29	1 35	1 41	1 47	1 54	2 1	13
14	2 11	1 55	1 44	1 35	1 28	1 24	1 21	1 18	1 19	1 22	1 26	1 30	1 35	1 41	1 47	1 52	14
15	2 19	2 2	1 50	1 39	1 32	1 27	1 23	1 19	1 18	1 20	1 23	1 26	1 30	1 35	1 40	1 44	15
16	2 28	2 9	1 55	1 44	1 35	1 30	1 25	1 20	1 17	1 18	1 20	1 23	1 26	1 30	1 34	1 38	16
17	2 37	2 16	2 0	1 48	1 39	1 33	1 27	1 21	1 18	1 17	1 18	1 20	1 23	1 26	1 30	1 33	17
18	2 46	2 23	2 6	1 53	1 43	1 36	1 30	1 23	1 19	1 16	1 17	1 18	1 20	1 23	1 26	1 29	18
19	2 56	2 30	2 12	1 59	1 48	1 40	1 33	1 25	1 20	1 17	1 16	1 17	1 18	1 20	1 23	1 26	19
20	3 5	2 37	2 18	2 4	1 52	1 44	1 37	1 27	1 22	1 18	1 15	1 16	1 17	1 18	1 20	1 23	20
21	3 14	2 44	2 24	2 9	1 57	1 48	1 40	1 29	1 23	1 19	1 16	1 16	1 16	1 17	1 18	1 20	21
22	3 23	2 52	2 31	2 15	2 1	1 52	1 44	1 32	1 25	1 20	1 16	1 15	1 15	1 16	1 17	1 18	22
23	3 32	2 59	2 38	2 20	2 6	1 56	1 47	1 34	1 26	1 21	1 17	1 15	1 14	1 15	1 16	1 17	23
24	3 41	3 7	2 44	2 26	2 11	2 0	1 51	1 37	1 28	1 22	1 18	1 15	1 14	1 14	1 15	1 16	24
25	3 50	3 14	2 51	2 31	2 16	2 4	1 54	1 40	1 30	1 23	1 19	1 16	1 14	1 13	1 14	1 15	25
26	3 59	3 22	2 58	2 37	2 21	2 8	1 58	1 42	1 32	1 25	1 20	1 16	1 14	1 13	1 13	1 14	26
27	4 8	3 30	3 5	2 42	2 26	2 12	2 2	1 45	1 33	1 26	1 21	1 17	1 15	1 14	1 13	1 13	27
28	4 17	3 38	3 12	2 48	2 31	2 16	2 6	1 48	1 35	1 28	1 22	1 18	1 15	1 14	1 13	1 13	28
29	4 26	3 45	3 19	2 53	2 36	2 21	2 10	1 51	1 37	1 29	1 23	1 19	1 16	1 14	1 13	1 12	29
30	4 34	3 53	3 25	2 59	2 41	2 25	2 13	1 54	1 39	1 31	1 24	1 19	1 16	1 14	1 13	1 12	30
31	4 43	4 0	3 32	3 5	2 45	2 29	2 17	1 57	1 41	1 32	1 25	1 20	1 17	1 15	1 13	1 12	31
32	4 52	4 8	3 38	3 10	2 50	2 34	2 20	1 59	1 43	1 34	1 27	1 21	1 17	1 15	1 13	1 12	32
33	5 0	4 15	3 44	3 16	2 55	2 38	2 24	2 2	1 45	1 36	1 29	1 23	1 18	1 15	1 13	1 12	33
34	5 9	4 22	3 50	3 21	2 59	2 42	2 27	2 5	1 48	1 38	1 30	1 24	1 19	1 16	1 14	1 12	34
35	5 17	4 29	3 56	3 27	3 4	2 46	2 31	2 7	1 51	1 40	1 32	1 25	1 20	1 17	1 14	1 12	35
36	5 26	4 36	4 2	3 32	3 9	2 50	2 34	2 10	1 53	1 42	1 33	1 26	1 21	1 17	1 14	1 12	36
37	5 34	4 42	4 8	3 37	3 14	2 54	2 38	2 13	1 56	1 44	1 34	1 27	1 22	1 18	1 15	1 13	37
38	5 42	4 49	4 13	3 42	3 18	2 58	2 42	2 16	1 58	1 46	1 36	1 28	1 22	1 18	1 15	1 13	38
39	5 50	4 56	4 19	3 47	3 23	3 2	2 46	2 19	2 1	1 48	1 38	1 30	1 23	1 18	1 15	1 13	39
40	5 58	5 3	4 24	3 52	3 27	3 6	2 49	2 22	2 3	1 50	1 39	1 31	1 25	1 19	1 16	1 14	40
41	6 6	5 9	4 30	3 57	3 32	3 10	2 53	2 25	2 6	1 52	1 41	1 32	1 26	1 20	1 16	1 14	41
42	6 14	5 15	4 35	4 2	3 36	3 14	2 56	2 28	2 8	1 54	1 42	1 34	1 27	1 21	1 17	1 15	42
43	6 21	5 21	4 41	4 7	3 40	3 18	3 0	2 31	2 11	1 56	1 44	1 35	1 28	1 22	1 18	1 15	43
44	6 28	5 27	4 46	4 12	3 44	3 22	3 3	2 34	2 13	1 58	1 45	1 37	1 29	1 23	1 19	1 16	41
46	6 42	5 39	4 56	4 21	3 52	3 29	3 10	2 39	2 18	2 1	1 48	1 39	1 31	1 24	1 20	1 17	46
48	6 55	5 51	5 6	4 30	3 59	3 36	3 16	2 44	2 22	2 5	1 51	1 41	1 33	1 26	1 21	1 18	48
50	7 8	6 2	5 16	4 38	4 7	3 43	3 23	2 49	2 26	2 8	1 54	1 43	1 35	1 27	1 22	1 19	50
52	7 21	6 13	5 25	4 46	4 15	3 50	3 29	2 54	2 30	2 11	1 57	1 45	1 36	1 29	1 24	1 20	52
54	7 33	6 23	5 34	4 53	4 22	3 56	3 35	2 59	2 34	2 14	2 0	1 48	1 38	1 31	1 25	1 21	54
56	7 44	6 33	5 43	4 59	4 29	4 2	3 40	3 4	2 38	2 17	2 2	1 50	1 40	1 32	1 26	1 22	56
58	7 53	6 42	5 50	5 6	4 35	4 7	3 45	3 8	2 42	2 20	2 5	1 53	1 42	1 33	1 27	1 23	58
60	8 2	6 49	5 56	5 12	4 40	4 12	3 50	3 12	2 46	2 23	2 7	1 55	1 44	1 35	1 29	1 24	60
62			6 2	5 17	4 45	4 16	3 54	3 15	2 49	2 26	2 9	1 57	1 46	1 36	1 30	1 25	62
64					4 50	4 20	3 58	3 18	2 51	2 28	2 11	1 59	1 48	1 37	1 31	1 26	64
66							4 1	3 20	2 53	2 30	2 13	2 0	1 49	1 39	1 32	1 26	66
68								3 22	2 54	2 32	2 15	2 1	1 50	1 40	1 33	1 27	68
70									2 55	2 33	2 16	2 2	1 51	1 41	1 34	1 2[illegible]	70
72										2 34	2 17	2 3	1 52	1 42	1 34	1 28	72
74											2 18	2 4	1 53	1 43	1 35	1 29	74
76												2 5	1 54	1 44	1 36	1 29	76
78													1 55	1 44	1 36	1 30	78
80														1 45	1 37	1 30	80
82															1 38	1 30	82
84																1 31	84
86																	86
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 52°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	4 43	5 1	5 18	5 34	6 6	6 36	7 4	7 29	7 53								6
7	3 59	4 14	4 29	4 43	5 9	5 34	5 58	6 20	6 42								7
8	3 30	3 43	3 55	4 8	4 30	4 52	5 13	5 32	5 50	6 6							8
9	3 4	3 15	3 26	3 37	3 58	4 17	4 36	4 51	5 5	5 18							9
10	2 45	2 54	3 4	3 14	3 32	3 48	4 4	4 20	4 33	4 45							10
11	2 30	2 38	2 47	2 55	3 11	3 26	3 40	3 54	4 6	4 16							11
12	2 17	2 25	2 32	2 40	2 54	3 7	3 20	3 32	3 43	3 52	4 1						12
13	2 7	2 13	2 20	2 26	2 39	2 51	3 3	3 14	3 24	3 32	3 38						13
14	1 58	2 3	2 9	2 14	2 26	2 37	2 48	2 58	3 7	3 14	3 20						14
15	1 49	1 54	1 59	2 4	2 15	2 26	2 35	2 44	2 52	2 59	3 5						15
16	1 42	1 47	1 51	1 56	2 7	2 16	2 24	2 32	2 40	2 46	2 52	2 57					16
17	1 37	1 41	1 45	1 50	2 0	2 8	2 15	2 22	2 29	2 35	2 40	2 44					17
18	1 32	1 36	1 40	1 45	1 53	2 0	2 7	2 13	2 19	2 25	2 30	2 33					18
19	1 29	1 32	1 36	1 40	1 47	1 53	2 0	2 6	2 11	2 16	2 21	2 24					19
20	1 26	1 29	1 32	1 35	1 41	1 47	1 53	1 59	2 4	2 9	2 13	2 16	2 19				20
21	1 23	1 26	1 28	1 31	1 37	1 42	1 47	1 53	1 58	2 2	2 6	2 9	2 11				21
22	1 21	1 23	1 25	1 28	1 33	1 37	1 42	1 47	1 52	1 56	1 59	2 2	2 4				22
23	1 19	1 21	1 23	1 25	1 29	1 33	1 38	1 42	1 47	1 51	1 54	1 56	1 58				23
24	1 17	1 19	1 21	1 23	1 26	1 30	1 34	1 38	1 42	1 46	1 49	1 51	1 53	1 55			24
25	1 16	1 17	1 19	1 20	1 23	1 27	1 30	1 34	1 37	1 41	1 44	1 46	1 48	1 49			25
26	1 15	1 16	1 17	1 18	1 21	1 21	1 27	1 30	1 33	1 36	1 39	1 41	1 43	1 44			26
27	1 14	1 15	1 16	1 17	1 19	1 22	1 24	1 27	1 30	1 32	1 35	1 37	1 39	1 40			27
28	1 13	1 14	1 15	1 16	1 17	1 20	1 22	1 24	1 27	1 29	1 31	1 33	1 35	1 36	1 37		28
29	1 12	1 13	1 14	1 15	1 16	1 18	1 20	1 22	1 24	1 26	1 28	1 30	1 31	1 32	1 33		29
30	1 12	1 12	1 13	1 13	1 14	1 16	1 18	1 20	1 22	1 24	1 25	1 27	1 28	1 29	1 30		30
31	1 11	1 11	1 12	1 12	1 13	1 15	1 16	1 18	1 20	1 22	1 23	1 24	1 25	1 26	1 27		31
32	1 11	1 11	1 11	1 11	1 12	1 14	1 15	1 16	1 18	1 20	1 21	1 22	1 23	1 23	1 24	1 25	32
33	1 11	1 10	1 10	1 10	1 11	1 13	1 14	1 15	1 17	1 18	1 19	1 20	1 21	1 21	1 22	1 22	33
34	1 11	1 10	1 10	1 10	1 11	1 12	1 13	1 14	1 16	1 17	1 17	1 18	1 19	1 19	1 20	1 20	34
35	1 11	1 10	1 10	1 10	1 10	1 11	1 12	1 13	1 14	1 15	1 15	1 16	1 17	1 17	1 18	1 18	35
36	1 11	1 10	1 9	1 9	1 9	1 10	1 11	1 11	1 12	1 13	1 13	1 14	1 15	1 15	1 16	1 16	36
37	1 11	1 10	1 9	1 9	1 9	1 9	1 10	1 10	1 11	1 11	1 12	1 12	1 13	1 13	1 14	1 14	37
38	1 11	1 10	1 9	1 8	1 8	1 9	1 9	1 9	1 10	1 10	1 11	1 11	1 11	1 11	1 12	1 12	38
39	1 11	1 10	1 9	1 8	1 8	1 8	1 8	1 8	1 9	1 9	1 10	1 10	1 10	1 10	1 10	1 10	39
40	1 12	1 10	1 9	1 8	1 7	1 7	1 7	1 7	1 8	1 8	1 9	1 9	1 9	1 9	1 9	1 9	40
41	1 12	1 11	1 9	1 8	1 7	1 7	1 7	1 7	1 7	1 7	1 8	1 8	1 8	1 8	1 8	1 8	41
42	1 13	1 11	1 9	1 8	1 6	1 6	1 6	1 6	1 6	1 6	1 7	1 7	1 7	1 7	1 7	1 7	42
43	1 13	1 11	1 9	1 8	1 6	1 6	1 6	1 6	1 6	1 6	1 6	1 6	1 6	1 6	1 6	1 6	43
44	1 14	1 11	1 9	1 8	1 6	1 5	1 5	1 5	1 5	1 5	1 5	1 5	1 5	1 5	1 5	1 5	44
46	1 14	1 12	1 10	1 9	1 6	1 4	1 4	1 4	1 4	1 4	1 4	1 3	1 3	1 3	1 3		46
48	1 15	1 13	1 11	1 9	1 6	1 4	1 3	1 3	1 3	1 2	1 2	1 1	1 1	1 1	1 1		48
50	1 16	1 14	1 11	1 9	1 6	1 4	1 2	1 2	1 3	1 1	1 0	1 0	1 0	1 0			50
52	1 17	1 15	1 12	1 9	1 6	1 4	1 2	1 1	1 1	1 0	1 0	59	58	58			52
54	1 18	1 15	1 12	1 9	1 6	1 4	1 2	1 1	1 0	59	59	58	57				54
56	1 18	1 15	1 12	1 10	1 6	1 4	1 2	1 0	59	58	58	57	56				56
58	1 19	1 16	1 13	1 10	1 6	1 4	1 2	1 0	59	58	57	56					
60	1 20	1 16	1 13	1 10	1 7	1 4	1 2	1 0	58	57	56	55					
62	1 21	1 17	1 13	1 10	1 7	1 4	1 1	59	58	56	55						
64	1 22	1 18	1 14	1 11	1 7	1 4	1 1	59	57	56	54						
66	1 22	1 18	1 14	1 11	1 7	1 4	1 1	59	57	55							
68	1 22	1 18	1 14	1 11	1 7	1 3	1 0	58	56	54							
70	1 23	1 18	1 14	1 11	1 7	1 3	1 0	58	56								
72	1 23	1 19	1 15	1 11	1 7	1 3	1 0	57	55								
74	1 24	1 19	1 15	1 11	1 7	1 3	1 0	57									
76	1 24	1 19	1 15	1 12	1 7	1 3	1 0	56									
78	1 24	1 19	1 15	1 12	1 7	1 3	1 0										
80	1 24	1 19	1 15	1 12	1 7	1 3	1 0										
82	1 25	1 20	1 16	1 12	1 7	1 3											
84	1 25	1 20	1 16	1 12	1 7	1 3											
86	1 25	1 21	1 16	1 12	1 7												
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°						

TABLE P. EFFECT OF SUN'S PAR.

Add the Numbers above the lines to 3rd Correction, subtract the others.

☽'s App Alt.	Sun's Apparent Altitude.									
	5	10	20	30	40	50	60	70	80	90
	″	″	″	″	″	″	″	″	″	″
5	0	1	2	3	4	4				
10	1	1	1	2	3	3	4			
20	3	3	1	0	1	2	2	3		
30	5	4	3	2	1	0	0	1		
40	7	6	5	4	3	2	1	1	0	0
50	8	8	6	5	4	3	3	2	2	
60		9	7	6	5	4	4	3		
70			8	7	6	5	5			
80				8	7	6				
90					7					

TABLE XVIII.

THIRD CORRECTION to APPARENT DISTANCE 56°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	1 20	1 22	1 25	1 29	1 35	1 41	1 48	2 2	2 18	2 35	2 52	3 10	3 27	3 45	4 3	4 20	6
7	1 23	1 20	1 22	1 24	1 27	1 32	1 37	1 48	2 1	2 15	2 29	2 43	2 58	3 12	3 27	3 42	7
8	1 28	1 23	1 20	1 21	1 23	1 26	1 29	1 38	1 48	2 0	2 12	2 23	2 35	2 48	3 1	3 14	8
9	1 34	1 27	1 22	1 20	1 21	1 23	1 25	1 31	1 39	1 48	1 58	2 8	2 18	2 29	2 40	2 50	9
10	1 40	1 31	1 25	1 22	1 20	1 21	1 22	1 26	1 32	1 39	1 48	1 56	2 5	2 15	2 24	2 33	10
11	1 47	1 36	1 29	1 25	1 22	1 20	1 21	1 23	1 27	1 33	1 40	1 47	1 55	2 4	2 12	2 20	11
12	1 54	1 42	1 33	1 28	1 21	1 21	1 20	1 21	1 24	1 28	1 34	1 40	1 47	1 55	2 2	2 9	12
13	2 2	1 48	1 38	1 31	1 26	1 23	1 21	1 20	1 22	1 25	1 30	1 35	1 41	1 47	1 54	2 0	13
14	2 10	1 54	1 43	1 35	1 29	1 25	1 22	1 19	1 20	1 23	1 27	1 31	1 36	1 41	1 47	1 52	14
15	2 18	2 1	1 48	1 39	1 33	1 28	1 24	1 21	1 19	1 21	1 24	1 27	1 32	1 36	1 41	1 46	15
16	2 27	2 8	1 53	1 43	1 36	1 31	1 26	1 22	1 19	1 19	1 21	1 24	1 28	1 32	1 36	1 40	16
17	2 35	2 15	1 59	1 47	1 40	1 34	1 29	1 23	1 20	1 18	1 19	1 22	1 25	1 28	1 32	1 35	17
18	2 44	2 22	2 4	1 52	1 43	1 37	1 31	1 25	1 20	1 17	1 18	1 20	1 22	1 25	1 28	1 31	18
19	2 53	2 29	2 10	1 57	1 47	1 40	1 34	1 26	1 21	1 18	1 17	1 19	1 20	1 23	1 25	1 28	19
20	3 2	2 36	2 16	2 2	1 51	1 44	1 37	1 28	1 22	1 19	1 17	1 18	1 19	1 21	1 23	1 25	20
21	3 11	2 44	2 22	2 8	1 55	1 47	1 40	1 30	1 24	1 20	1 18	1 17	1 18	1 19	1 21	1 23	21
22	3 20	2 51	2 29	2 13	2 0	1 51	1 43	1 32	1 25	1 21	1 18	1 16	1 17	1 18	1 19	1 21	22
23	3 29	2 58	2 35	2 18	2 5	1 55	1 46	1 35	1 27	1 22	1 19	1 17	1 16	1 17	1 18	1 19	23
24	3 38	3 5	2 42	2 23	2 9	1 59	1 50	1 37	1 29	1 24	1 20	1 17	1 16	1 16	1 17	1 18	24
25	3 47	3 13	2 49	2 29	2 14	2 3	1 53	1 39	1 31	1 25	1 21	1 18	1 16	1 16	1 16	1 17	25
26	3 55	3 20	2 55	2 34	2 19	2 7	1 57	1 42	1 33	1 27	1 22	1 19	1 17	1 16	1 16	1 16	26
27	4 4	3 27	3 1	2 39	2 24	2 12	2 1	1 45	1 35	1 28	1 23	1 19	1 17	1 16	1 16	1 16	27
28	4 12	3 34	3 8	2 45	2 29	2 16	2 5	1 48	1 37	1 30	1 24	1 20	1 18	1 16	1 15	1 16	28
29	4 21	3 41	3 14	2 50	2 33	2 20	2 8	1 51	1 39	1 31	1 25	1 21	1 18	1 16	1 15	1 15	29
30	4 29	3 48	3 20	2 55	2 38	2 24	2 12	1 54	1 41	1 33	1 26	1 21	1 18	1 16	1 15	1 15	30
31	4 38	3 55	3 26	3 6	2 43	2 28	2 16	1 57	1 44	1 34	1 28	1 22	1 18	1 16	1 16	1 15	31
32	4 46	4 2	3 32	3 6	2 48	2 32	2 19	2 0	1 46	1 36	1 29	1 23	1 19	1 17	1 16	1 15	32
33	4 54	4 9	3 39	3 11	2 53	2 36	2 23	2 3	1 49	1 38	1 31	1 25	1 20	1 17	1 16	1 15	33
34	5 2	4 16	3 45	3 16	2 57	2 40	2 26	2 6	1 51	1 40	1 32	1 26	1 21	1 18	1 16	1 15	34
35	5 10	4 23	3 51	3 22	3 2	2 44	2 30	2 9	1 53	1 42	1 34	1 27	1 22	1 18	1 16	1 15	35
36	5 18	4 30	3 57	3 27	3 6	2 48	2 33	2 12	1 55	1 44	1 35	1 28	1 23	1 19	1 17	1 16	36
37	5 26	4 37	4 3	3 32	3 10	2 52	2 37	2 15	1 58	1 46	1 37	1 29	1 24	1 20	1 18	1 16	37
38	5 33	4 43	4 8	3 37	3 14	2 56	2 41	2 17	2 0	1 48	1 38	1 30	1 25	1 21	1 18	1 16	38
39	5 41	4 50	4 14	3 42	3 19	3 0	2 45	2 20	2 2	1 50	1 39	1 31	1 25	1 21	1 18	1 16	39
40	5 48	4 56	4 19	3 47	3 23	3 4	2 48	2 23	2 4	1 51	1 40	1 32	1 26	1 22	1 19	1 16	40
41	5 55	5 2	4 25	3 52	3 28	3 8	2 51	2 25	2 6	1 53	1 42	1 33	1 27	1 23	1 29	1 17	41
42	6 2	5 8	4 30	3 57	3 32	3 11	2 54	2 28	2 9	1 55	1 43	1 34	1 28	1 21	1 20	1 17	42
43	6 9	5 14	4 35	4 2	3 36	3 15	2 58	2 31	2 12	1 57	1 44	1 35	1 29	1 25	1 21	1 17	43
44	6 16	5 20	4 40	4 7	3 40	3 19	3 1	2 34	2 14	1 59	1 46	1 37	1 31	1 26	1 22	1 18	44
46	6 29	5 32	4 50	4 16	3 48	3 26	3 8	2 40	2 18	2 2	1 49	1 40	1 33	1 28	1 23	1 19	46
48	6 42	5 43	4 59	4 24	3 56	3 33	3 14	2 45	2 22	2 6	1 52	1 43	1 36	1 30	1 25	1 20	48
50	6 54	5 54	5 8	4 32	4 3	3 40	3 19	2 50	2 26	2 9	1 55	1 45	1 38	1 32	1 26	1 21	50
52	7 6	6 4	5 17	4 39	4 10	3 46	3 24	2 55	2 30	2 12	1 58	1 48	1 40	1 33	1 27	1 22	52
54	7 18	6 14	5 25	4 46	4 16	3 52	3 29	2 59	2 34	2 15	2 0	1 50	1 42	1 35	1 29	1 24	54
56	7 29	6 24	5 33	4 53	4 22	3 57	3 34	3 3	2 37	2 19	2 3	1 52	1 43	1 36	1 30	1 25	56
58	7 40	6 33	5 41	5 0	4 28	4 2	3 39	3 7	2 41	2 22	2 6	1 54	1 45	1 37	1 31	1 26	58
60	7 50	6 41	5 48	5 7	4 34	4 7	3 43	3 11	2 44	2 25	2 8	1 56	1 47	1 39	1 32	1 27	60
62	7 58	6 48	5 55	5 13	4 40	4 12	3 48	3 15	2 47	2 28	2 11	1 58	1 48	1 40	1 33	1 28	62
64	8 6	6 55	6 1	5 19	4 45	4 17	3 52	3 18	2 50	2 30	2 13	2 0	1 50	1 41	1 34	1 29	64
66			6 7	5 24	4 50	4 21	3 56	3 20	2 53	2 32	2 15	2 2	1 51	1 42	1 35	1 29	66
68					4 55	4 25	4 0	3 22	2 55	2 34	2 17	2 4	1 52	1 43	1 36	1 30	68
70							4 4	3 24	2 57	2 36	2 18	2 5	1 53	1 44	1 37	1 31	70
72								3 26	2 59	2 37	2 19	2 6	1 54	1 45	1 38	1 32	72
74									3 1	2 38	2 29	2 7	1 55	1 46	1 39	1 32	74
76										2 39	2 21	2 8	1 56	1 47	1 39	1 33	76
78											2 22	2 8	1 57	1 48	1 40	1 33	78
80												2 9	1 58	1 48	1 40	1 34	80
82													1 58	1 48	1 40	1 34	82
84														1 49	1 41	1 34	84
86															1 41	1 34	86
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	21°	26°	28°	30°	

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 56°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	4 37	4 54	5 10	5 26	5 56	6 25	6 52	7 15	7 37	7 58							6
7	3 57	4 11	4 25	4 38	5 3	5 29	5 52	6 12	6 31	6 48							7
8	3 26	3 38	3 51	4 3	4 26	4 47	5 5	5 23	5 40	5 55	6 9						8
9	3 1	3 12	3 23	3 33	3 53	4 12	4 30	4 46	5 0	5 13	5 25						9
10	2 43	2 53	3 2	3 11	3 28	3 45	4 1	4 15	4 27	4 39	4 50						10
11	2 29	2 37	2 45	2 53	3 9	3 24	3 38	3 50	4 1	4 12	4 21						11
12	2 16	2 23	2 30	2 38	2 52	3 6	3 18	3 28	3 38	3 47	3 56	4 4					12
13	2 6	2 12	2 18	2 25	2 37	2 50	3 1	3 10	3 19	3 28	3 36	3 42					13
14	1 57	2 3	2 8	2 14	2 25	2 30	2 47	2 56	3 4	3 12	3 19	3 24					14
15	1 50	1 55	1 59	2 5	2 15	2 25	2 35	2 44	2 51	2 58	3 4	3 10					15
16	1 44	1 48	1 53	1 58	2 7	2 16	2 25	2 33	2 39	2 45	2 51	2 57	3 2				16
17	1 39	1 43	1 48	1 52	2 0	2 8	2 16	2 24	2 30	2 35	2 40	2 45	2 49				17
18	1 35	1 39	1 43	1 47	1 54	2 1	2 8	2 15	2 21	2 26	2 31	2 35	2 38				18
19	1 31	1 35	1 38	1 42	1 48	1 55	2 1	2 7	2 13	2 18	2 23	2 27	2 30				19
20	1 28	1 31	1 34	1 37	1 43	1 49	1 55	2 0	2 6	2 10	2 15	2 19	2 22	2 25			20
21	1 25	1 27	1 30	1 33	1 38	1 44	1 49	1 54	1 58	2 3	2 7	2 11	2 14	2 16			21
22	1 22	1 24	1 27	1 30	1 34	1 39	1 44	1 48	1 52	1 56	2 0	2 4	2 6	2 8			22
23	1 20	1 22	1 24	1 27	1 31	1 35	1 40	1 44	1 47	1 51	1 54	1 57	2 0	2 2			23
24	1 19	1 20	1 22	1 25	1 28	1 32	1 36	1 40	1 43	1 46	1 49	1 52	1 54	1 56	1 58		24
25	1 18	1 19	1 21	1 23	1 26	1 29	1 33	1 36	1 39	1 42	1 44	1 47	1 49	1 51	1 53		25
26	1 17	1 18	1 19	1 21	1 24	1 27	1 30	1 33	1 35	1 38	1 40	1 42	1 44	1 46	1 48		26
27	1 16	1 17	1 18	1 19	1 22	1 25	1 27	1 30	1 32	1 35	1 37	1 39	1 40	1 42	1 44		27
28	1 16	1 16	1 17	1 18	1 20	1 23	1 25	1 27	1 29	1 32	1 34	1 36	1 37	1 39	1 40	1 41	28
29	1 15	1 15	1 16	1 17	1 19	1 21	1 23	1 25	1 27	1 29	1 31	1 33	1 34	1 35	1 36	1 37	29
30	1 15	1 15	1 16	1 16	1 17	1 19	1 21	1 23	1 25	1 27	1 29	1 30	1 31	1 32	1 33	1 34	30
31	1 14	1 14	1 15	1 15	1 16	1 18	1 19	1 21	1 23	1 25	1 27	1 28	1 29	1 29	1 30	1 31	31
32	1 14	1 14	1 14	1 14	1 15	1 17	1 18	1 19	1 21	1 23	1 25	1 26	1 27	1 27	1 27	1 28	32
33	1 14	1 13	1 13	1 13	1 14	1 16	1 17	1 18	1 20	1 21	1 23	1 24	1 25	1 25	1 25	1 26	33
34	1 14	1 13	1 13	1 13	1 14	1 15	1 16	1 17	1 19	1 20	1 21	1 22	1 23	1 23	1 23	1 24	34
35	1 14	1 13	1 13	1 13	1 13	1 14	1 15	1 16	1 17	1 18	1 19	1 20	1 21	1 21	1 21	1 22	35
36	1 14	1 13	1 12	1 12	1 12	1 13	1 14	1 15	1 16	1 16	1 17	1 18	1 19	1 19	1 19	1 20	36
37	1 14	1 13	1 12	1 12	1 12	1 12	1 13	1 14	1 15	1 15	1 16	1 16	1 17	1 17	1 17	1 18	37
38	1 14	1 13	1 12	1 11	1 11	1 12	1 13	1 13	1 14	1 14	1 15	1 15	1 16	1 16	1 16	1 17	38
39	1 14	1 13	1 12	1 11	1 11	1 11	1 12	1 12	1 13	1 13	1 13	1 13	1 14	1 14	1 15	1 15	39
40	1 14	1 13	1 12	1 11	1 10	1 10	1 11	1 11	1 12	1 12	1 12	1 12	1 12	1 13	1 13	1 13	40
41	1 15	1 14	1 12	1 11	1 10	1 10	1 10	1 10	1 11	1 11	1 11	1 11	1 11	1 12	1 12		41
42	1 15	1 14	1 12	1 11	1 9	1 9	1 9	1 9	1 10	1 10	1 10	1 10	1 10	1 11	1 11		42
43	1 15	1 14	1 12	1 11	1 9	1 9	1 9	1 9	1 9	1 9	1 9	1 9	1 9	1 10	1 10		43
44	1 16	1 14	1 12	1 11	1 9	1 8	1 8	1 8	1 8	1 8	1 8	1 8	1 8	1 9	1 9		44
46	1 17	1 15	1 13	1 12	1 9	1 7	1 7	1 7	1 6	1 6	1 6	1 7	1 7	1 7			46
48	1 17	1 15	1 13	1 12	1 9	1 7	1 6	1 6	1 5	1 5	1 5	1 5	1 5	1 6			48
50	1 18	1 16	1 14	1 12	1 9	1 6	1 5	1 5	1 4	1 4	1 4	1 4	1 4				50
52	1 19	1 17	1 15	1 13	1 9	1 6	1 4	1 4	1 3	1 3	1 3	1 3	1 3				52
54	1 20	1 17	1 15	1 13	1 9	1 6	1 4	1 3	1 3	1 2	1 2	1 2					54
56	1 21	1 18	1 16	1 14	1 10	1 6	1 4	1 2	1 2	1 1	1 1	1 1					56
58	1 22	1 19	1 16	1 14	1 10	1 6	1 4	1 2	1 1	1 0	1 0						
60	1 23	1 19	1 16	1 14	1 10	1 6	1 4	1 2	1 1	1 0	1 0						
62	1 24	1 20	1 17	1 14	1 10	1 6	1 4	1 2	1 1	1 0							
64	1 24	1 20	1 17	1 14	1 11	1 7	1 4	1 2	1 0	1 0							
66	1 25	1 21	1 18	1 15	1 11	1 7	1 4	1 2	1 0								
68	1 25	1 21	1 18	1 15	1 11	1 7	1 4	1 2	1 0								
70	1 26	1 22	1 19	1 16	1 11	1 7	1 4	1 2									
72	1 27	1 23	1 19	1 16	1 11	1 7	1 4	1 2									
74	1 27	1 23	1 19	1 16	1 11	1 7	1 4										
76	1 28	1 23	1 19	1 16	1 11	1 7	1 4										
78	1 28	1 23	1 20	1 17	1 11	1 7											
80	1 29	1 24	1 20	1 17	1 11	1 7											
82	1 29	1 24	1 20	1 17	1 11												
84	1 29	1 24	1 20	1 17	1 11												
86	1 29	1 24	1 20	1 17													
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°						

TABLE *P*. EFFECT OF SUN'S PAR

Add the Numbers above the lines to 3rd Correction, subtract the others.

☽'s App Alt.	Sun's Apparent Altitude.									
	5	10	20	30	40	50	60	70	80	90
	″	″	″	″	″	″	″	″	″	″
5	0	0	1	2	3	4	4			
10	1	1	0	1	2	3	3			
20	3	3	2	1	0	1	2	2		
30	5	4	3	2	1	1	0	0	1	
40	6	6	5	4	3	2	2	1	1	0
50	8	7	6	5	4	4	3	3		
60	9	8	7	6	5	5	4			
70		9	8	7	6	6				
80			8	8	7					
90				8						

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 60°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	1 22	1 23	1 25	1 28	1 33	1 40	1 47	2 1	2 16	2 33	2 50	3 8	3 25	3 41	3 58	4 15	6
7	1 24	1 22	1 23	1 25	1 28	1 33	1 37	1 47	1 59	2 13	2 27	2 41	2 55	3 9	3 23	3 37	7
8	1 28	1 24	1 22	1 23	1 25	1 28	1 31	1 39	1 48	1 59	2 11	2 23	2 35	2 48	3 0	3 12	8
9	1 33	1 28	1 24	1 22	1 24	1 25	1 27	1 33	1 40	1 49	1 58	2 8	2 18	2 29	2 39	2 50	9
10	1 40	1 33	1 27	1 24	1 23	1 24	1 25	1 29	1 34	1 41	1 49	1 57	2 6	2 15	2 25	2 34	10
11	1 47	1 38	1 31	1 27	1 24	1 23	1 24	1 26	1 30	1 36	1 42	1 49	1 57	2 5	2 13	2 21	11
12	1 55	1 43	1 36	1 30	1 26	1 24	1 23	1 25	1 28	1 32	1 37	1 43	1 49	1 56	2 3	2 11	12
13	2 3	1 49	1 40	1 34	1 29	1 26	1 24	1 24	1 26	1 29	1 33	1 38	1 43	1 49	1 55	2 2	13
14	2 10	1 55	1 45	1 38	1 32	1 28	1 25	1 23	1 25	1 27	1 30	1 34	1 38	1 43	1 49	1 54	14
15	2 18	2 1	1 50	1 42	1 36	1 31	1 27	1 24	1 23	1 25	1 27	1 30	1 34	1 38	1 43	1 48	15
16	2 26	2 7	1 55	1 46	1 39	1 34	1 29	1 25	1 22	1 23	1 25	1 27	1 30	1 34	1 38	1 43	16
17	2 34	2 13	2 0	1 50	1 43	1 37	1 31	1 26	1 22	1 22	1 23	1 25	1 28	1 31	1 34	1 38	17
18	2 42	2 20	2 5	1 54	1 46	1 40	1 34	1 27	1 23	1 21	1 22	1 23	1 25	1 28	1 31	1 34	18
19	2 50	2 27	2 11	1 59	1 50	1 43	1 36	1 29	1 24	1 22	1 21	1 22	1 23	1 26	1 28	1 31	19
20	2 59	2 34	2 17	2 4	1 54	1 46	1 39	1 31	1 25	1 22	1 20	1 21	1 22	1 24	1 26	1 28	20
21	3 7	2 41	2 23	2 9	1 58	1 50	1 42	1 33	1 26	1 23	1 21	1 20	1 21	1 22	1 24	1 25	21
22	3 15	2 48	2 29	2 14	2 2	1 53	1 45	1 35	1 28	1 24	1 21	1 20	1 20	1 21	1 22	1 23	22
23	3 24	2 55	2 35	2 19	2 7	1 57	1 48	1 37	1 30	1 25	1 22	1 20	1 20	1 20	1 21	1 22	23
24	3 32	3 2	2 41	2 24	2 10	2 1	1 52	1 40	1 31	1 26	1 23	1 21	1 20	1 20	1 20	1 21	24
25	3 41	3 9	2 47	2 29	2 15	2 4	1 55	1 42	1 33	1 27	1 24	1 22	1 20	1 19	1 19	1 20	25
26	3 49	3 16	2 53	2 34	2 20	2 8	1 59	1 45	1 35	1 29	1 25	1 22	1 20	1 19	1 19	1 19	26
27	3 58	3 23	2 59	2 39	2 25	2 12	2 3	1 48	1 38	1 31	1 26	1 23	1 21	1 19	1 19	1 19	27
28	4 6	3 30	3 5	2 44	2 29	2 16	2 7	1 51	1 40	1 32	1 27	1 23	1 21	1 19	1 18	1 18	28
29	4 15	3 37	3 11	2 49	2 33	2 20	2 11	1 53	1 42	1 34	1 28	1 24	1 21	1 19	1 18	1 18	29
30	4 23	3 44	3 17	2 54	2 38	2 24	2 14	1 56	1 44	1 35	1 29	1 24	1 21	1 19	1 18	1 18	30
31	4 31	3 51	3 23	2 59	2 42	2 28	2 18	1 59	1 46	1 37	1 30	1 25	1 22	1 20	1 18	1 18	31
32	4 39	3 58	3 29	3 4	2 47	2 32	2 21	2 2	1 48	1 38	1 31	1 26	1 22	1 20	1 19	1 18	32
33	4 47	4 5	3 34	3 9	2 52	2 36	2 25	2 5	1 51	1 40	1 33	1 27	1 23	1 20	1 19	1 18	33
34	4 55	4 12	3 40	3 14	2 56	2 40	2 28	2 8	1 53	1 41	1 34	1 28	1 24	1 21	1 19	1 18	34
35	5 3	4 18	3 46	3 19	3 0	2 44	2 32	2 11	1 55	1 43	1 35	1 29	1 25	1 22	1 20	1 18	35
36	5 10	4 24	3 52	3 24	3 4	2 48	2 35	2 14	1 57	1 45	1 37	1 31	1 26	1 22	1 20	1 18	36
37	5 18	4 31	3 58	3 29	3 8	2 52	2 39	2 17	1 59	1 47	1 38	1 32	1 27	1 23	1 21	1 19	37
38	5 25	4 38	4 4	3 34	3 12	2 55	2 42	2 20	2 2	1 49	1 40	1 33	1 28	1 24	1 21	1 19	38
39	5 32	4 45	4 10	3 39	3 17	2 59	2 46	2 22	2 4	1 51	1 42	1 35	1 29	1 25	1 22	1 20	39
40	5 39	4 51	4 15	3 44	3 21	3 3	2 49	2 25	2 6	1 53	1 43	1 36	1 30	1 26	1 22	1 20	40
41	5 46	4 57	4 21	3 49	3 26	3 7	2 52	2 27	2 8	1 55	1 45	1 37	1 31	1 27	1 23	1 20	41
42	5 53	5 3	4 26	3 53	3 30	3 11	2 55	2 30	2 10	1 56	1 46	1 38	1 32	1 28	1 24	1 21	42
43	6 0	5 9	4 31	3 58	3 35	3 15	2 58	2 32	2 13	1 58	1 48	1 40	1 34	1 29	1 25	1 22	43
44	6 7	5 15	4 36	4 3	3 39	3 19	3 1	2 35	2 15	2 0	1 49	1 41	1 35	1 30	1 26	1 22	44
46	6 21	5 26	4 46	4 12	3 47	3 26	3 7	2 40	2 19	2 4	1 52	1 43	1 37	1 31	1 27	1 23	46
48	6 34	5 37	4 55	4 20	3 54	3 32	3 13	2 45	2 23	2 8	1 56	1 46	1 39	1 33	1 28	1 24	48
50	6 47	5 48	5 4	4 28	4 1	3 37	3 19	2 50	2 27	2 11	1 59	1 48	1 41	1 35	1 29	1 25	50
52	6 59	5 58	5 13	4 36	4 8	3 43	3 25	2 55	2 31	2 14	2 2	1 51	1 43	1 36	1 31	1 27	52
54	7 11	6 8	5 22	4 44	4 15	3 49	3 30	2 59	2 35	2 18	2 4	1 53	1 45	1 38	1 33	1 28	54
56	7 22	6 17	5 30	4 51	4 21	3 55	3 35	3 4	2 38	2 21	2 7	1 56	1 47	1 40	1 34	1 29	56
58	7 31	6 25	5 37	4 58	4 27	4 1	3 40	3 8	2 41	2 24	2 10	1 58	1 49	1 41	1 35	1 30	58
60	7 40	6 32	5 45	5 4	4 32	4 6	3 45	3 12	2 44	2 27	2 12	2 0	1 50	1 42	1 36	1 31	60
62	7 48	6 39	5 52	5 10	4 38	4 11	3 50	3 16	2 48	2 29	2 14	2 2	1 52	1 44	1 37	1 32	62
64	7 56	6 46	5 58	5 15	4 43	4 15	3 55	3 19	2 51	2 31	2 16	2 4	1 53	1 45	1 38	1 33	64
66	8 3	6 53	6 2	5 20	4 47	4 19	3 59	3 22	2 54	2 33	2 18	2 5	1 55	1 46	1 39	1 34	66
68	8 10	6 59	6 6	5 24	4 51	4 23	4 2	3 25	2 56	2 35	2 19	2 6	1 56	1 47	1 40	1 34	68
70			6 10	5 27	4 54	4 26	4 4	3 27	2 58	2 36	2 20	2 7	1 57	1 48	1 41	1 35	70
72					4 57	4 29	4 6	3 28	3 0	2 38	2 21	2 8	1 58	1 49	1 41	1 35	72
74							4 8	3 29	3 2	2 39	2 22	2 9	1 59	1 50	1 42	1 36	74
76								3 30	3 3	2 41	2 23	2 10	1 59	1 50	1 42	1 36	76
78									3 4	2 42	2 24	2 11	2 0	1 51	1 43	1 37	78
80										2 43	2 25	2 12	2 1	1 51	1 43	1 37	80
82											2 26	2 12	2 1	1 52	1 44	1 38	82
84												2 12	2 2	1 52	1 44	1 38	84
86													2 2	1 52	1 44	1 38	86
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE XVIII.

THIRD CORRECTION to APPARENT DISTANCE 60°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	4 32	4 48	5 3	5 19	5 49	6 17	6 44	7 7	7 28	7 47	8 3						6
7	3 51	4 5	4 19	4 32	4 58	5 22	5 44	6 4	6 22	6 38	6 53						7
8	3 23	3 35	3 47	3 59	4 22	4 42	5 1	5 19	5 35	5 50	6 2	6 13					8
9	3 0	3 10	3 20	3 30	3 49	4 8	4 25	4 41	4 55	5 8	5 19	5 30					9
10	2 43	2 51	3 0	3 9	3 26	3 42	3 58	4 12	4 24	4 35	4 45	4 54					10
11	2 29	2 37	2 44	2 52	3 7	3 21	3 35	3 48	3 59	4 9	4 18	4 26					11
12	2 18	2 25	2 32	2 39	2 52	3 5	3 17	3 29	3 39	3 48	3 56	4 3	4 8				12
13	2 8	2 15	2 21	2 28	2 39	2 51	3 2	3 12	3 21	3 30	3 38	3 44	3 48				13
14	2 0	2 6	2 12	2 18	2 28	2 38	2 48	2 57	3 6	3 14	3 21	3 26	3 29				14
15	1 53	1 58	2 3	2 8	2 18	2 27	2 36	2 45	2 53	3 0	3 6	3 11	3 15				15
16	1 47	1 51	1 55	2 0	2 9	2 18	2 26	2 34	2 41	2 48	2 53	2 58	3 2	3 6			16
17	1 42	1 45	1 49	1 53	2 1	2 9	2 17	2 24	2 31	2 37	2 42	2 46	2 50	2 53			17
18	1 37	1 40	1 44	1 47	1 54	2 1	2 9	2 16	2 22	2 27	2 32	2 36	2 40	2 42			18
19	1 33	1 36	1 39	1 42	1 48	1 55	2 2	2 9	2 15	2 19	2 24	2 28	2 31	2 33			19
20	1 30	1 32	1 35	1 38	1 44	1 50	1 56	2 2	2 8	2 12	2 17	2 20	2 23	2 25	2 27		20
21	1 27	1 29	1 32	1 35	1 40	1 46	1 51	1 56	2 1	2 6	2 10	2 13	2 15	2 17	2 19		21
22	1 25	1 27	1 29	1 32	1 37	1 42	1 47	1 51	1 56	2 0	2 4	2 6	2 8	2 10	2 12		22
23	1 23	1 25	1 27	1 30	1 34	1 38	1 43	1 47	1 51	1 55	1 59	2 1	2 3	2 4	2 6		23
24	1 22	1 23	1 25	1 27	1 31	1 35	1 40	1 44	1 47	1 51	1 54	1 56	1 58	1 59	2 1	2 3	24
25	1 21	1 22	1 23	1 25	1 29	1 32	1 36	1 40	1 43	1 47	1 49	1 51	1 53	1 54	1 56	1 57	25
26	1 20	1 21	1 22	1 23	1 26	1 29	1 33	1 37	1 40	1 43	1 45	1 47	1 49	1 50	1 51	1 52	26
27	1 19	1 20	1 21	1 22	1 24	1 27	1 30	1 34	1 37	1 40	1 42	1 43	1 45	1 46	1 47	1 48	27
28	1 19	1 19	1 20	1 21	1 23	1 25	1 28	1 31	1 34	1 37	1 39	1 40	1 41	1 42	1 43	1 44	28
29	1 18	1 18	1 19	1 20	1 22	1 23	1 26	1 29	1 31	1 34	1 36	1 37	1 38	1 39	1 40	1 41	29
30	1 18	1 18	1 18	1 19	1 20	1 22	1 24	1 27	1 29	1 31	1 33	1 34	1 35	1 36	1 37	1 38	30
31	1 18	1 18	1 18	1 18	1 19	1 20	1 22	1 25	1 27	1 29	1 30	1 31	1 32	1 33	1 34	1 35	31
32	1 17	1 17	1 17	1 17	1 18	1 19	1 21	1 23	1 25	1 27	1 28	1 29	1 30	1 31	1 31	1 32	32
33	1 17	1 16	1 16	1 16	1 17	1 18	1 19	1 21	1 23	1 25	1 26	1 27	1 28	1 29	1 29	1 30	33
34	1 17	1 16	1 16	1 16	1 16	1 17	1 18	1 20	1 22	1 23	1 24	1 25	1 26	1 27	1 27	1 28	34
35	1 17	1 16	1 16	1 16	1 16	1 16	1 17	1 18	1 20	1 21	1 22	1 23	1 24	1 25	1 25	1 26	35
36	1 17	1 16	1 15	1 16	1 16	1 16	1 16	1 17	1 18	1 19	1 20	1 21	1 22	1 23	1 23	1 24	36
37	1 17	1 16	1 15	1 15	1 15	1 15	1 15	1 16	1 17	1 18	1 19	1 20	1 21	1 21	1 22		37
38	1 17	1 16	1 15	1 14	1 14	1 14	1 14	1 15	1 16	1 17	1 18	1 19	1 20	1 20	1 21		38
39	1 18	1 16	1 15	1 14	1 13	1 13	1 13	1 14	1 15	1 16	1 17	1 17	1 18	1 18	1 19		39
40	1 18	1 16	1 15	1 14	1 13	1 13	1 13	1 14	1 14	1 15	1 16	1 16	1 17	1 17	1 17		40
41	1 18	1 16	1 15	1 14	1 12	1 12	1 12	1 13	1 13	1 14	1 15	1 15	1 16	1 16			41
42	1 18	1 16	1 15	1 14	1 12	1 12	1 12	1 12	1 12	1 13	1 14	1 14	1 15	1 15			42
43	1 19	1 17	1 16	1 14	1 12	1 11	1 11	1 11	1 11	1 12	1 13	1 13	1 14	1 14			43
44	1 19	1 17	1 16	1 14	1 12	1 11	1 11	1 11	1 11	1 11	1 12	1 12	1 13	1 13			44
46	1 20	1 18	1 16	1 14	1 12	1 11	1 10	1 10	1 10	1 10	1 11	1 11	1 11				46
48	1 21	1 19	1 17	1 15	1 12	1 10	1 9	1 9	1 9	1 9	1 10	1 10	1 10				48
50	1 22	1 19	1 17	1 15	1 12	1 10	1 9	1 8	1 8	1 8	1 8	1 8					50
52	1 23	1 20	1 17	1 15	1 12	1 10	1 8	1 8	1 8	1 7	1 7	1 7					52
54	1 24	1 21	1 18	1 16	1 13	1 10	1 8	1 7	1 7	1 6	1 6						54
56	1 25	1 22	1 19	1 16	1 13	1 10	1 8	1 7	1 7	1 6	1 6						56
58	1 26	1 23	1 20	1 17	1 13	1 10	1 8	1 7	1 6	1 5							
60	1 27	1 24	1 21	1 18	1 14	1 10	1 8	1 7	1 6	1 5							
62	1 28	1 24	1 21	1 18	1 14	1 10	1 8	1 6	1 5								
64	1 29	1 25	1 21	1 18	1 14	1 10	1 8	1 6	1 5								
66	1 29	1 25	1 21	1 18	1 14	1 11	1 8	1 6									
68	1 29	1 25	1 22	1 19	1 15	1 11	1 8	1 6									
70	1 30	1 26	1 22	1 19	1 15	1 11	1 8										
72	1 30	1 26	1 23	1 20	1 15	1 11	1 8										
74	1 31	1 27	1 23	1 20	1 15	1 11											
76	1 31	1 27	1 23	1 20	1 15	1 11											
78	1 32	1 28	1 24	1 20	1 15												
80	1 32	1 28	1 24	1 21	1 15												
82	1 33	1 28	1 24	1 21													
84	1 33	1 28	1 24	1 21													
86	1 33	1 28	1 24														
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°						

TABLE P. EFFECT OF SUN'S PAR.

Add the Numbers above the lines to 3rd Correction, subtract the others.

☽'s App Alt.	Sun's Apparent Altitude.									
	5	10	20	30	40	50	60	70	80	90
	″	″	″	″	″	″	″	″	″	″
5	0	0	1	2	3	3	4			
10	1	1	0	1	2	2	3	3		
20	3	3	2	1	0	0	1	1	2	
30	5	4	3	3	2	2	1	1	0	
40	6	6	5	4	3	3	2	2	2	
50	7	7	6	5	5	4	3	3		
60	9	8	7	6	6	5	4			
70		9	8	7	6	6				
80			8	8	7					
90				8						

TABLE XVIII.

THIRD CORRECTION to APPARENT DISTANCE 64°.

☽'s Ap Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	1 26	1 27	1 29	1 32	1 36	1 42	1 49	2 3	2 19	2 35	2 51	3 8	3 24	3 40	3 56	4 12	6
7	1 28	1 26	1 27	1 29	1 32	1 35	1 40	1 51	2 3	2 15	2 28	2 42	2 56	3 9	3 22	3 36	7
8	1 32	1 28	1 26	1 27	1 29	1 31	1 34	1 42	1 51	2 2	2 13	2 24	2 36	2 48	3 0	3 11	8
9	1 37	1 31	1 28	1 26	1 27	1 28	1 30	1 36	1 43	1 52	2 1	2 10	2 20	2 31	2 41	2 51	9
10	1 43	1 35	1 30	1 27	1 26	1 27	1 28	1 32	1 37	1 44	1 51	1 59	2 8	2 17	2 26	2 35	10
11	1 50	1 40	1 33	1 29	1 27	1 26	1 27	1 29	1 33	1 38	1 44	1 51	1 59	2 7	2 14	2 22	11
12	1 57	1 45	1 37	1 32	1 29	1 27	1 26	1 28	1 30	1 34	1 38	1 44	1 51	1 58	2 5	2 12	12
13	2 4	1 50	1 41	1 35	1 31	1 29	1 27	1 27	1 28	1 31	1 34	1 38	1 44	1 50	1 57	2 3	13
14	2 12	1 56	1 46	1 39	1 34	1 31	1 29	1 26	1 27	1 29	1 31	1 34	1 39	1 44	1 50	1 55	14
15	2 20	2 2	1 51	1 43	1 37	1 33	1 30	1 27	1 26	1 27	1 29	1 31	1 35	1 40	1 44	1 49	15
16	2 27	2 8	1 56	1 47	1 41	1 36	1 32	1 28	1 25	1 26	1 27	1 29	1 32	1 36	1 40	1 44	16
17	2 35	2 14	2 1	1 51	1 45	1 39	1 34	1 29	1 26	1 25	1 26	1 28	1 30	1 33	1 36	1 40	17
18	2 43	2 21	2 6	1 56	1 48	1 42	1 37	1 31	1 27	1 25	1 25	1 26	1 28	1 30	1 33	1 36	18
19	2 51	2 27	2 12	2 0	1 52	1 45	1 39	1 32	1 28	1 25	1 25	1 25	1 27	1 28	1 30	1 33	19
20	2 59	2 34	2 17	2 5	1 56	1 49	1 42	1 34	1 29	1 26	1 24	1 24	1 25	1 26	1 28	1 30	20
21	3 7	2 41	2 23	2 10	2 0	1 52	1 45	1 36	1 30	1 26	1 24	1 23	1 24	1 25	1 26	1 28	21
22	3 15	2 48	2 29	2 15	2 4	1 55	1 48	1 38	1 31	1 27	1 25	1 23	1 23	1 24	1 25	1 26	22
23	3 23	2 55	2 35	2 20	2 8	1 59	1 51	1 40	1 33	1 28	1 25	1 23	1 23	1 24	1 24	1 25	23
24	3 31	3 2	2 41	2 25	2 12	2 2	1 54	1 42	1 34	1 29	1 26	1 24	1 23	1 23	1 24	1 25	24
25	3 39	3 8	2 47	2 30	2 17	2 6	1 57	1 44	1 36	1 30	1 26	1 24	1 23	1 23	1 23	1 24	25
26	3 47	3 15	2 53	2 35	2 21	2 10	2 0	1 47	1 38	1 32	1 27	1 25	1 23	1 23	1 23	1 23	26
27	3 56	3 22	2 59	2 40	2 26	2 14	2 4	1 50	1 40	1 33	1 28	1 25	1 23	1 23	1 22	1 23	27
28	4 4	3 29	3 5	2 45	2 30	2 18	2 7	1 53	1 42	1 35	1 29	1 26	1 24	1 23	1 22	1 22	28
29	4 12	3 36	3 11	2 50	2 35	2 22	2 11	1 55	1 44	1 36	1 30	1 27	1 25	1 23	1 22	1 22	29
30	4 20	3 42	3 17	2 55	2 39	2 26	2 15	1 58	1 46	1 38	1 32	1 28	1 25	1 24	1 23	1 22	30
31	4 28	3 49	3 23	3 0	2 43	2 30	2 18	2 0	1 48	1 40	1 33	1 29	1 26	1 24	1 23	1 22	31
32	4 36	3 55	3 28	3 5	2 48	2 34	2 22	2 3	1 50	1 41	1 34	1 30	1 26	1 24	1 23	1 22	32
33	4 44	4 2	3 34	3 10	2 52	2 38	2 26	2 6	1 53	1 43	1 36	1 30	1 27	1 24	1 23	1 22	33
34	4 52	4 8	3 39	3 15	2 56	2 41	2 29	2 8	1 55	1 44	1 37	1 31	1 28	1 25	1 23	1 22	34
35	5 0	4 15	3 45	3 20	3 1	2 45	2 33	2 11	1 57	1 46	1 38	1 32	1 28	1 25	1 23	1 22	35
36	5 7	4 21	3 51	3 25	3 5	2 49	2 36	2 14	1 59	1 47	1 39	1 33	1 29	1 26	1 24	1 23	36
37	5 14	4 28	3 57	3 30	3 9	2 53	2 40	2 17	2 2	1 49	1 41	1 34	1 30	1 27	1 25	1 23	37
38	5 21	4 34	4 2	3 35	3 14	2 57	2 43	2 20	2 4	1 52	1 43	1 36	1 31	1 27	1 25	1 23	38
39	5 28	4 41	4 7	3 39	3 18	3 1	2 46	2 23	2 6	1 54	1 45	1 37	1 32	1 28	1 25	1 23	39
40	5 35	4 47	4 12	3 44	3 22	3 4	2 49	2 26	2 9	1 56	1 46	1 38	1 33	1 29	1 26	1 24	40
41	5 42	4 53	4 17	3 49	3 26	3 8	2 52	2 29	2 11	1 58	1 48	1 40	1 34	1 29	1 26	1 24	41
42	5 49	4 59	4 22	3 53	3 30	3 11	2 55	2 31	2 13	2 0	1 49	1 41	1 35	1 30	1 27	1 24	42
43	5 56	5 5	4 27	3 58	3 34	3 15	2 59	2 34	2 15	2 2	1 51	1 42	1 36	1 31	1 28	1 25	43
44	6 2	5 11	4 32	4 3	3 38	3 19	3 2	2 36	2 17	2 3	1 52	1 44	1 38	1 32	1 29	1 26	44
46	6 15	5 21	4 42	4 11	3 45	3 26	3 8	2 41	2 22	2 6	1 55	1 47	1 40	1 34	1 30	1 27	46
48	6 28	5 32	4 52	4 19	3 53	3 32	3 14	2 45	2 26	2 10	1 58	1 49	1 42	1 36	1 32	1 28	48
50	6 40	5 42	5 1	4 27	4 0	3 38	3 20	2 50	2 29	2 14	2 1	1 51	1 44	1 37	1 33	1 29	50
52	6 52	5 52	5 10	4 35	4 7	3 44	3 25	2 55	2 33	2 17	2 4	1 54	1 46	1 39	1 34	1 30	52
54	7 3	6 1	5 18	4 42	4 14	3 50	3 30	2 59	2 37	2 20	2 7	1 56	1 48	1 41	1 35	1 31	54
56	7 14	6 10	5 26	4 49	4 20	3 55	3 35	3 3	2 41	2 23	2 9	1 58	1 49	1 43	1 37	1 32	56
58	7 24	6 18	5 34	4 56	4 25	4 0	3 39	3 7	2 44	2 26	2 11	2 0	1 52	1 45	1 38	1 33	58
60	7 32	6 26	5 41	5 2	4 30	4 5	3 44	3 11	2 47	2 29	2 14	2 2	1 54	1 47	1 40	1 35	60
62	7 40	6 33	5 47	5 7	4 35	4 10	3 49	3 15	2 50	2 31	2 16	2 4	1 55	1 48	1 41	1 36	62
64	7 48	6 40	5 53	5 12	4 40	4 15	3 53	3 19	2 52	2 34	2 19	2 6	1 56	1 49	1 42	1 37	64
66	7 55	6 47	5 59	5 17	4 45	4 19	3 57	3 22	2 54	2 36	2 21	2 8	1 57	1 50	1 43	1 38	66
68	8 1	6 53	6 4	5 22	4 49	4 23	4 1	3 24	2 56	2 38	2 22	2 9	1 59	1 51	1 44	1 38	68
70	8 7	6 59	6 8	5 26	4 53	4 26	4 4	3 26	2 58	2 40	2 23	2 10	2 0	1 52	1 45	1 39	70
72	8 12	7 4	6 11	5 30	4 56	4 29	4 6	3 28	3 0	2 41	2 24	2 11	2 1	1 53	1 46	1 39	72
74			6 14	5 33	4 59	4 31	4 8	3 30	3 2	2 42	2 25	2 12	2 2	1 54	1 47	1 40	74
76					5 1	4 33	4 9	3 32	3 4	2 43	2 26	2 13	2 3	1 54	1 47	1 40	76
78							4 10	3 33	3 6	2 44	2 27	2 14	2 3	1 54	1 47	1 41	78
80								3 34	3 7	2 45	2 28	2 15	2 4	1 55	1 47	1 41	80
82									3 8	2 46	2 29	2 16	2 4	1 55	1 48	1 42	82
84										2 47	2 29	2 16	2 5	1 56	1 49	1 42	84
86											2 29	2 16	2 6	1 56	1 49	1 42	86
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 64°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	4 29	4 45	5 0	5 15	5 43	6 10	6 36	6 59	7 20	7 39	7 54	8 7					6
7	3 49	4 2	4 15	4 28	4 53	5 16	5 37	5 57	6 15	6 32	6 46	6 59					7
8	3 22	3 34	3 45	3 56	4 18	4 38	4 57	5 15	5 31	5 46	5 58	6 7	6 16				8
9	3 0	3 10	3 20	3 30	3 49	4 7	4 23	4 38	4 52	5 5	5 16	5 26	5 34				9
10	2 43	2 52	3 1	3 10	3 27	3 42	3 56	4 9	4 21	4 32	4 42	4 51	4 59				10
11	2 30	2 37	2 45	2 54	3 9	3 22	3 35	3 47	3 57	4 7	4 16	4 24	4 31				11
12	2 19	2 25	2 33	2 40	2 53	3 5	3 17	3 27	3 37	3 47	3 56	4 3	4 8	4 13			12
13	2 9	2 15	2 22	2 28	2 40	2 51	3 1	3 11	3 20	3 29	3 37	3 43	3 47	3 51			13
14	2 1	2 7	2 13	2 18	2 29	2 39	2 48	2 57	3 6	3 14	3 20	3 25	3 29	3 33			14
15	1 54	2 0	2 5	2 10	2 19	2 29	2 37	2 45	2 53	3 0	3 5	3 10	3 14	3 18			15
16	1 48	1 53	1 58	2 3	2 11	2 20	2 28	2 35	2 42	2 48	2 53	2 57	3 1	3 5	3 8		16
17	1 43	1 47	1 52	1 56	2 4	2 12	2 20	2 26	2 32	2 38	2 43	2 47	2 51	2 54	2 56		17
18	1 39	1 43	1 47	1 50	1 58	2 5	2 12	2 18	2 24	2 30	2 35	2 39	2 42	2 44	2 46		18
19	1 36	1 39	1 42	1 46	1 52	1 59	2 5	2 11	2 17	2 22	2 27	2 31	2 34	2 36	2 38		19
20	1 33	1 36	1 38	1 42	1 48	1 54	1 59	2 5	2 11	2 15	2 20	2 23	2 26	2 28	2 30	2 32	20
21	1 30	1 33	1 35	1 38	1 44	1 49	1 54	2 0	2 5	2 9	2 13	2 16	2 18	2 20	2 22	2 23	21
22	1 28	1 30	1 33	1 35	1 40	1 45	1 50	1 55	1 59	2 3	2 6	2 9	2 11	2 13	2 15	2 16	22
23	1 27	1 28	1 30	1 32	1 37	1 41	1 46	1 51	1 54	1 58	2 1	2 3	2 5	2 7	2 9	2 10	23
24	1 26	1 27	1 28	1 30	1 34	1 38	1 42	1 47	1 50	1 54	1 57	1 59	2 0	2 2	2 4	2 5	24
25	1 25	1 26	1 27	1 28	1 32	1 35	1 39	1 43	1 47	1 50	1 53	1 55	1 56	1 58	1 59	2 0	25
26	1 24	1 25	1 26	1 27	1 30	1 33	1 36	1 40	1 44	1 47	1 49	1 51	1 52	1 54	1 55	1 56	26
27	1 23	1 24	1 25	1 26	1 28	1 31	1 34	1 37	1 41	1 44	1 46	1 47	1 49	1 50	1 51	1 52	27
28	1 23	1 23	1 24	1 25	1 26	1 29	1 32	1 35	1 38	1 41	1 43	1 44	1 45	1 46	1 47	1 48	28
29	1 22	1 22	1 23	1 24	1 25	1 27	1 30	1 32	1 35	1 38	1 40	1 41	1 42	1 43	1 44	1 45	29
30	1 22	1 22	1 23	1 23	1 24	1 26	1 28	1 30	1 33	1 35	1 37	1 38	1 39	1 40	1 41	1 42	30
31	1 22	1 22	1 22	1 22	1 23	1 24	1 26	1 28	1 31	1 33	1 34	1 35	1 36	1 37	1 38	1 40	31
32	1 21	1 21	1 21	1 21	1 22	1 23	1 25	1 27	1 29	1 31	1 32	1 33	1 34	1 35	1 36	1 38	32
33	1 21	1 21	1 21	1 21	1 21	1 22	1 24	1 26	1 27	1 29	1 30	1 31	1 32	1 33	1 34		33
34	1 21	1 20	1 20	1 20	1 20	1 21	1 23	1 25	1 26	1 27	1 28	1 29	1 30	1 31	1 32		34
35	1 21	1 20	1 20	1 20	1 20	1 21	1 22	1 23	1 24	1 25	1 26	1 27	1 28	1 29	1 30		35
36	1 21	1 20	1 19	1 19	1 19	1 20	1 21	1 22	1 23	1 24	1 25	1 26	1 26	1 27	1 28		36
37	1 21	1 20	1 19	1 19	1 19	1 19	1 20	1 21	1 22	1 23	1 24	1 25	1 25	1 26			37
38	1 21	1 20	1 19	1 18	1 18	1 18	1 19	1 20	1 21	1 22	1 23	1 24	1 24	1 25			38
39	1 21	1 20	1 19	1 18	1 18	1 18	1 18	1 19	1 20	1 21	1 21	1 22	1 22	1 23			39
40	1 22	1 20	1 19	1 18	1 17	1 17	1 18	1 18	1 19	1 20	1 20	1 21	1 21	1 22			40
41	1 22	1 20	1 19	1 18	1 17	1 17	1 17	1 17	1 18	1 19	1 19	1 20	1 20				41
42	1 22	1 20	1 19	1 18	1 16	1 16	1 16	1 17	1 17	1 18	1 18	1 19	1 19				42
43	1 23	1 21	1 19	1 18	1 16	1 16	1 16	1 16	1 16	1 17	1 17	1 18	1 18				43
44	1 23	1 21	1 19	1 18	1 16	1 16	1 16	1 16	1 16	1 16	1 16	1 17	1 17				44
46	1 24	1 22	1 20	1 18	1 16	1 15	1 15	1 15	1 15	1 15	1 15	1 16					46
48	1 25	1 22	1 20	1 19	1 16	1 15	1 15	1 14	1 14	1 14	1 14	1 14					48
50	1 26	1 23	1 21	1 19	1 16	1 15	1 14	1 13	1 13	1 13	1 13						50
52	1 27	1 24	1 22	1 20	1 17	1 15	1 13	1 12	1 12	1 12	1 12						52
54	1 28	1 25	1 22	1 20	1 17	1 15	1 13	1 12	1 11	1 11							54
56	1 29	1 26	1 23	1 21	1 17	1 15	1 13	1 12	1 11	1 11							56
58	1 29	1 26	1 23	1 21	1 18	1 15	1 13	1 11	1 10								
60	1 30	1 27	1 24	1 22	1 18	1 15	1 13	1 11	1 10								
62	1 31	1 28	1 25	1 22	1 18	1 15	1 13	1 11									
64	1 32	1 28	1 25	1 22	1 18	1 15	1 13	1 11									
66	1 33	1 29	1 26	1 23	1 18	1 16	1 13										
68	1 33	1 29	1 26	1 23	1 19	1 16	1 13										
70	1 34	1 30	1 27	1 24	1 19	1 16											
72	1 34	1 30	1 27	1 24	1 19	1 16											
74	1 35	1 31	1 28	1 24	1 19												
76	1 35	1 31	1 28	1 25	1 20												
78	1 36	1 32	1 28	1 25													
80	1 36	1 32	1 28	1 25													
82	1 37	1 32	1 28														
84	1 37	1 32															
86	1 37																
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°						

TABLE P. EFFECT OF SUN'S PAR.

Add the Numbers above the lines to 3rd Correction, subtract the others.

☽'s App Alt.	Sun's Apparent Altitude.									
	5	10	20	30	40	50	60	70	80	90
	″	″	″	″	″	″	″	″	″	″
5	0	0	1	1	2	3	3	3		
10	1	1	0	0	1	2	2	2		
20	3	3	2	1	1	0	0	1	1	
30	5	4	3	3	2	2	1	1	1	0
40	6	6	5	4	4	3	3	2	2	
50	7	7	6	5	5	4	4	4		
60	8	8	7	6	6	5	5			
70	9	9	8	7	7	6				
80			8	8	7					
90				8						

TABLE XVIII

THIRD CORRECTION, to APPARENT DISTANCE 68°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	1 29	1 31	1 34	1 37	1 41	1 46	1 52	2 6	2 21	2 36	2 52	3 8	3 24	3 39	3 54	4 10	6
7	1 32	1 29	1 31	1 33	1 36	1 39	1 43	1 54	2 5	2 17	2 30	2 43	2 56	3 9	3 22	3 36	7
8	1 36	1 31	1 29	1 30	1 32	1 34	1 37	1 45	1 54	2 4	2 14	2 25	2 37	2 48	2 59	3 11	8
9	1 41	1 34	1 31	1 29	1 30	1 31	1 33	1 38	1 46	1 54	2 3	2 12	2 22	2 32	2 42	2 52	9
10	1 46	1 38	1 33	1 30	1 29	1 30	1 31	1 34	1 40	1 47	1 54	2 2	2 10	2 19	2 28	2 36	10
11	1 52	1 43	1 36	1 32	1 30	1 29	1 30	1 32	1 36	1 41	1 47	1 54	2 1	2 9	2 16	2 24	11
12	1 59	1 48	1 40	1 35	1 32	1 30	1 29	1 30	1 33	1 37	1 42	1 48	1 54	2 0	2 7	2 14	12
13	2 6	1 53	1 44	1 38	1 34	1 32	1 30	1 29	1 31	1 34	1 38	1 43	1 48	1 53	1 59	2 5	13
14	2 14	1 59	1 49	1 42	1 37	1 34	1 31	1 29	1 30	1 32	1 35	1 39	1 44	1 48	1 53	1 58	14
15	2 21	2 5	1 54	1 46	1 40	1 36	1 33	1 30	1 30	1 31	1 33	1 36	1 40	1 44	1 48	1 53	15
16	2 28	2 11	1 59	1 50	1 44	1 39	1 35	1 31	1 29	1 30	1 32	1 34	1 37	1 40	1 44	1 48	16
17	2 36	2 17	2 4	1 54	1 47	1 42	1 38	1 32	1 29	1 29	1 30	1 32	1 34	1 37	1 40	1 44	17
18	2 44	2 24	2 10	1 59	1 51	1 45	1 40	1 34	1 30	1 28	1 29	1 30	1 32	1 35	1 37	1 40	18
19	2 52	2 30	2 15	2 4	1 55	1 48	1 43	1 35	1 31	1 28	1 28	1 29	1 31	1 33	1 35	1 37	19
20	3 0	2 36	2 21	2 8	1 59	1 52	1 46	1 37	1 32	1 29	1 28	1 29	1 30	1 31	1 33	1 35	20
21	3 8	2 43	2 26	2 13	2 3	1 55	1 48	1 39	1 33	1 30	1 28	1 28	1 29	1 30	1 31	1 33	21
22	3 15	2 49	2 32	2 17	2 7	1 58	1 51	1 41	1 35	1 31	1 29	1 27	1 28	1 29	1 30	1 31	22
23	3 23	2 56	2 37	2 22	2 11	2 2	1 54	1 43	1 37	1 32	1 29	1 27	1 27	1 28	1 29	1 30	23
24	3 31	3 3	2 43	2 27	2 15	2 5	1 57	1 46	1 39	1 34	1 30	1 28	1 27	1 28	1 28	1 29	24
25	3 39	3 9	2 48	2 32	2 19	2 9	2 0	1 48	1 41	1 35	1 31	1 29	1 27	1 27	1 27	1 28	25
26	3 47	3 16	2 54	2 37	2 23	2 12	2 4	1 51	1 43	1 36	1 32	1 30	1 28	1 27	1 27	1 27	26
27	3 55	3 23	3 0	2 42	2 27	2 16	2 7	1 54	1 44	1 37	1 33	1 30	1 28	1 27	1 26	1 27	27
28	4 2	3 29	3 5	2 47	2 31	2 19	2 10	1 56	1 46	1 39	1 34	1 31	1 29	1 27	1 26	1 26	28
29	4 10	3 36	3 11	2 52	2 35	2 23	2 14	1 59	1 48	1 41	1 35	1 32	1 29	1 27	1 26	1 26	29
30	4 17	3 42	3 16	2 57	2 40	2 27	2 17	2 1	1 50	1 42	1 36	1 32	1 29	1 27	1 26	1 26	30
31	4 25	3 49	3 22	3 2	2 44	2 31	2 20	2 3	1 52	1 43	1 37	1 33	1 30	1 28	1 27	1 26	31
32	4 32	3 55	3 27	3 7	2 49	2 34	2 23	2 6	1 54	1 45	1 38	1 33	1 30	1 28	1 27	1 26	32
33	4 40	4 2	3 33	3 12	2 53	2 38	2 26	2 9	1 56	1 47	1 39	1 34	1 31	1 29	1 27	1 26	33
34	4 48	4 8	3 39	3 16	2 57	2 42	2 30	2 12	1 58	1 48	1 41	1 35	1 32	1 30	1 28	1 26	34
35	4 55	4 15	3 45	3 21	3 2	2 46	2 34	2 15	2 0	1 50	1 43	1 37	1 33	1 30	1 28	1 26	35
36	5 2	4 21	3 50	3 26	3 6	2 50	2 37	2 17	2 3	1 52	1 44	1 38	1 34	1 31	1 28	1 26	36
37	5 10	4 27	3 56	3 30	3 10	2 53	2 41	2 20	2 5	1 54	1 46	1 39	1 35	1 31	1 28	1 26	37
38	5 17	4 33	4 1	3 35	3 14	2 57	2 44	2 22	2 7	1 56	1 48	1 41	1 36	1 32	1 29	1 27	38
39	5 24	4 39	4 6	3 40	3 18	3 1	2 47	2 25	2 9	1 58	1 50	1 43	1 37	1 33	1 30	1 27	39
40	5 31	4 45	4 11	3 45	3 22	3 5	2 50	2 27	2 11	2 0	1 51	1 44	1 38	1 34	1 31	1 28	40
41	5 38	4 51	4 16	3 49	3 26	3 9	2 53	2 30	2 14	2 2	1 53	1 45	1 39	1 35	1 31	1 28	41
42	5 44	4 57	4 21	3 53	3 30	3 12	2 56	2 32	2 16	2 4	1 54	1 46	1 40	1 36	1 32	1 29	42
43	5 50	5 2	4 26	3 58	3 34	3 16	2 59	2 34	2 19	2 6	1 56	1 48	1 41	1 37	1 33	1 30	43
44	5 57	5 8	4 31	4 2	3 38	3 19	3 3	2 37	2 21	2 8	1 57	1 49	1 43	1 38	1 34	1 31	44
46	6 10	5 19	4 41	4 10	3 46	3 26	3 9	2 42	2 25	2 11	1 59	1 51	1 45	1 40	1 35	1 31	46
48	6 22	5 29	4 50	4 18	3 53	3 32	3 15	2 47	2 29	2 14	2 2	1 54	1 47	1 41	1 36	1 32	48
50	6 34	5 39	4 59	4 26	3 59	3 38	3 21	2 52	2 33	2 18	2 5	1 56	1 49	1 43	1 38	1 33	50
52	6 45	5 48	5 7	4 33	4 6	3 44	3 26	2 56	2 36	2 21	2 8	1 58	1 51	1 45	1 39	1 35	52
54	6 56	5 57	5 14	4 40	4 12	3 50	3 31	3 0	2 39	2 24	2 11	2 0	1 52	1 46	1 40	1 36	54
56	7 6	6 6	5 21	4 46	4 18	3 55	3 36	3 4	2 42	2 27	2 14	2 2	1 54	1 47	1 41	1 37	56
58	7 15	6 14	5 28	4 52	4 24	4 0	3 41	3 8	2 45	2 29	2 16	2 4	1 56	1 49	1 43	1 38	58
60	7 24	6 22	5 35	4 58	4 29	4 5	3 45	3 12	2 48	2 32	2 18	2 6	1 58	1 51	1 45	1 39	60
62	7 33	6 29	5 42	5 3	4 34	4 10	3 49	3 15	2 51	2 34	2 20	2 8	1 59	1 52	1 46	1 40	62
64	7 41	6 35	5 48	5 8	4 39	4 14	3 53	3 18	2 54	2 36	2 22	2 10	2 1	1 53	1 47	1 41	64
66	7 48	6 41	5 53	5 13	4 43	4 18	3 57	3 21	2 56	2 38	2 24	2 12	2 2	1 54	1 48	1 42	66
68	7 55	6 47	5 58	5 17	4 47	4 22	4 0	3 24	2 59	2 40	2 26	2 14	2 3	1 55	1 49	1 43	68
70	8 1	6 52	6 3	5 21	4 51	4 25	4 3	3 27	3 1	2 42	2 27	2 15	2 4	1 56	1 50	1 44	70
72	8 7	6 57	6 8	5 25	4 55	4 28	4 6	3 30	3 3	2 44	2 28	2 15	2 5	1 57	1 51	1 45	72
74	8 12	7 1	6 12	5 29	4 58	4 30	4 8	3 32	3 5	2 45	2 29	2 16	2 5	1 57	1 51	1 45	74
76	8 17	7 5	6 15	5 32	5 1	4 32	4 10	3 34	3 7	2 46	2 30	2 17	2 6	1 58	1 51	1 45	76
78			6 18	5 35	5 3	4 34	4 12	3 35	3 9	2 47	2 31	2 18	2 7	1 58	1 52	1 46	78
80					5 5	4 36	4 13	3 36	3 10	2 48	2 32	2 18	2 7	1 59	1 52	1 46	80
82							4 14	3 37	3 11	2 49	2 32	2 19	2 8	1 59	1 52	1 46	82
84								3 38	3 11	2 50	2 33	2 20	2 9	2 0	1 53	1 46	84
86									3 12	2 50	2 33	2 20	2 9	2 0	1 53		86
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE XVIII.

Third Correction, to Apparent Distance 68°.

D's App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																D's App Alt.
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	4 25	4 40	4 55	5 11	5 40	6 5	6 29	6 51	7 11	7 29	7 45	8 0	8 14				6
7	3 49	4 1	4 14	4 27	4 52	5 15	5 35	5 53	6 10	6 25	6 38	6 50	7 1				7
8	3 22	3 33	3 44	3 55	4 17	4 37	4 55	5 11	5 25	5 38	5 51	6 2	6 10	6 18			8
9	3 1	3 11	3 21	3 30	3 48	4 6	4 22	4 36	4 49	5 0	5 10	5 19	5 28	5 36			9
10	2 44	2 53	3 2	3 10	3 25	3 41	3 55	4 9	4 21	4 31	4 40	4 49	4 57	5 3			10
11	2 31	2 39	2 47	2 54	3 8	3 22	3 35	3 47	3 58	4 8	4 16	4 23	4 29	4 34			11
12	2 20	2 27	2 34	2 41	2 53	3 6	3 18	3 29	3 39	3 48	3 55	4 2	4 7	4 11	4 15		12
13	2 11	2 17	2 23	2 29	2 41	2 52	3 2	3 12	3 22	3 30	3 37	3 43	3 48	3 52	3 56		13
14	2 3	2 9	2 14	2 19	2 30	2 40	2 49	2 58	3 6	3 14	3 20	3 26	3 31	3 35	3 38		14
15	1 57	2 2	2 6	2 11	2 21	2 30	2 38	2 46	2 54	3 1	3 7	3 12	3 16	3 20	3 23		15
16	1 52	1 56	2 0	2 4	2 13	2 22	2 29	2 37	2 44	2 50	2 55	3 0	3 4	3 8	3 10	3 12	16
17	1 47	1 51	1 55	1 58	2 6	2 14	2 21	2 29	2 35	2 40	2 45	2 49	2 53	2 57	2 59	3 0	17
18	1 43	1 47	1 50	1 54	2 1	2 8	2 14	2 22	2 27	2 32	2 36	2 40	2 44	2 47	2 49	2 50	18
19	1 40	1 43	1 46	1 50	1 56	2 2	2 8	2 15	2 20	2 25	2 29	2 32	2 36	2 39	2 41	2 42	19
20	1 37	1 40	1 43	1 46	1 52	1 57	2 3	2 9	2 14	2 18	2 22	2 25	2 28	2 31	2 33	2 34	20
21	1 35	1 37	1 40	1 43	1 48	1 53	1 58	2 3	2 8	2 12	2 16	2 19	2 21	2 23	2 25	2 26	21
22	1 33	1 35	1 37	1 40	1 44	1 49	1 54	1 58	2 2	2 6	2 10	2 13	2 15	2 17	2 19	2 20	22
23	1 31	1 33	1 35	1 37	1 41	1 46	1 50	1 54	1 57	2 1	2 5	2 8	2 10	2 12	2 14	2 15	23
24	1 30	1 31	1 33	1 35	1 39	1 43	1 47	1 50	1 53	1 57	2 0	2 3	2 5	2 7	2 9	2 10	24
25	1 29	1 30	1 31	1 33	1 37	1 40	1 44	1 47	1 50	1 53	1 56	1 59	2 1	2 2	2 4	2 5	25
26	1 28	1 29	1 31	1 32	1 35	1 38	1 41	1 44	1 47	1 50	1 53	1 55	1 57	1 58	1 59	2 0	26
27	1 27	1 28	1 29	1 30	1 33	1 36	1 38	1 41	1 44	1 47	1 50	1 52	1 53	1 54	1 55	1 56	27
28	1 27	1 27	1 28	1 29	1 31	1 34	1 36	1 39	1 41	1 44	1 47	1 49	1 50	1 51	1 52	1 52	28
29	1 26	1 26	1 27	1 28	1 29	1 32	1 34	1 37	1 39	1 41	1 44	1 46	1 47	1 48	1 49		29
30	1 26	1 26	1 26	1 27	1 28	1 30	1 32	1 35	1 37	1 39	1 41	1 43	1 44	1 45	1 46		30
31	1 25	1 25	1 26	1 26	1 27	1 29	1 31	1 33	1 35	1 37	1 39	1 40	1 41	1 42	1 43		31
32	1 25	1 25	1 25	1 25	1 26	1 28	1 29	1 31	1 33	1 35	1 37	1 38	1 39	1 40	1 41		32
33	1 25	1 24	1 25	1 25	1 26	1 27	1 28	1 30	1 31	1 33	1 35	1 36	1 37	1 38			33
34	1 25	1 24	1 24	1 24	1 25	1 26	1 27	1 29	1 30	1 31	1 33	1 34	1 35	1 36			34
35	1 25	1 24	1 24	1 24	1 24	1 25	1 26	1 28	1 29	1 30	1 31	1 32	1 33	1 34			35
36	1 25	1 24	1 23	1 23	1 23	1 24	1 25	1 27	1 28	1 29	1 30	1 30	1 31	1 32			36
37	1 25	1 24	1 23	1 23	1 23	1 23	1 24	1 26	1 27	1 28	1 29	1 29	1 30				37
38	1 25	1 24	1 23	1 22	1 22	1 23	1 24	1 25	1 26	1 27	1 28	1 28	1 29				38
39	1 25	1 24	1 23	1 22	1 22	1 23	1 23	1 24	1 25	1 26	1 27	1 27	1 27				39
40	1 26	1 25	1 24	1 23	1 22	1 22	1 23	1 23	1 24	1 25	1 26	1 26	1 26				40
41	1 26	1 25	1 24	1 23	1 21	1 21	1 22	1 22	1 23	1 24	1 25	1 25					41
42	1 27	1 25	1 24	1 23	1 21	1 21	1 21	1 22	1 23	1 23	1 24	1 24					42
43	1 27	1 25	1 24	1 23	1 21	1 21	1 21	1 21	1 22	1 22	1 23	1 23					43
44	1 28	1 26	1 24	1 23	1 21	1 20	1 20	1 20	1 21	1 21	1 22	1 22					44
46	1 28	1 26	1 25	1 24	1 21	1 19	1 19	1 19	1 20	1 20	1 20						46
48	1 29	1 27	1 25	1 24	1 22	1 19	1 18	1 18	1 19	1 19	1 19						48
50	1 30	1 28	1 26	1 25	1 22	1 20	1 18	1 18	1 18	1 18							50
52	1 31	1 29	1 27	1 25	1 22	1 20	1 18	1 17	1 17	1 17							52
54	1 32	1 29	1 27	1 26	1 23	1 20	1 18	1 17	1 16								54
56	1 33	1 30	1 28	1 26	1 23	1 20	1 18	1 16	1 15								56
58	1 34	1 31	1 29	1 27	1 23	1 20	1 18	1 16									58
60	1 35	1 32	1 29	1 27	1 23	1 20	1 18	1 16									60
62	1 36	1 33	1 30	1 28	1 23	1 20	1 18										62
64	1 37	1 33	1 30	1 28	1 24	1 20	1 17										64
66	1 38	1 34	1 31	1 28	1 24	1 20											66
68	1 38	1 34	1 31	1 28	1 24	1 20											68
70	1 39	1 35	1 32	1 29	1 24												70
72	1 39	1 35	1 32	1 29	1 24												72
74	1 40	1 36	1 32	1 29													74
76	1 40	1 36	1 32	1 29													76
78	1 41	1 36	1 32														78
80	1 41	1 36															80
82	1 41																82
84																	84
86																	86
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°						

TABLE *P*. EFFECT OF SUN's PAR

Add the Numbers above the lines to 3rd Correction, subtract the others.

D's App alt.	Sun's Apparent Altitude.									
	5	10	20	30	40	50	60	70	80	90
	″	″	″	″	″	″	″	″	″	″
5	1	0	0	1	1	2	2	3		
10	2	1	0	0	1	1	1	2	2	
20	3	3	2	1	1	0	0	0	0	0
30	4	4	4	3	2	2	2	1	1	
40	5	6	5	4	4	3	3	3		
50	6	7	6	6	5	5	4			
60	8	8	7	7	6	6				
70	9	8	8	7	7					
80		9	8	8						
90			8							

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 72°.

D's App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																D's App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	1 33	1 35	1 37	1 40	1 44	1 50	1 56	2 9	2 23	2 38	2 53	3 9	3 24	3 40	3 56	4 12	6
7	1 35	1 33	1 34	1 36	1 39	1 43	1 47	1 56	2 8	2 21	2 34	2 47	3 0	3 12	3 25	3 38	7
8	1 39	1 35	1 33	1 34	1 36	1 38	1 41	1 48	1 58	2 8	2 19	2 30	2 41	2 52	3 3	3 14	8
9	1 44	1 38	1 35	1 33	1 34	1 35	1 37	1 42	1 50	1 58	2 7	2 17	2 46	2 35	2 44	2 54	9
10	1 50	1 42	1 37	1 34	1 33	1 34	1 35	1 38	1 44	1 50	1 58	2 6	2 14	2 22	2 30	2 39	10
11	1 56	1 46	1 40	1 36	1 34	1 33	1 34	1 36	1 40	1 45	1 51	1 58	2 5	2 12	2 20	2 27	11
12	2 2	1 51	1 44	1 39	1 36	1 34	1 33	1 35	1 37	1 41	1 46	1 52	1 58	2 4	2 11	2 17	12
13	2 9	1 56	1 48	1 42	1 39	1 36	1 34	1 34	1 35	1 38	1 42	1 47	1 52	1 58	2 4	2 9	13
14	2 16	2 2	1 53	1 46	1 42	1 39	1 36	1 33	1 34	1 36	1 39	1 43	1 47	1 52	1 57	2 2	14
15	2 23	2 8	1 58	1 50	1 45	1 41	1 38	1 34	1 33	1 34	1 36	1 39	1 43	1 47	1 51	1 56	15
16	2 30	2 14	2 3	1 54	1 48	1 43	1 40	1 35	1 33	1 33	1 34	1 36	1 39	1 43	1 47	1 52	16
17	2 37	2 20	2 8	1 58	1 51	1 46	1 42	1 36	1 34	1 33	1 34	1 35	1 37	1 40	1 44	1 48	17
18	2 45	2 27	2 13	2 2	1 54	1 48	1 44	1 37	1 34	1 33	1 33	1 34	1 36	1 38	1 41	1 44	18
19	2 53	2 33	2 18	2 7	1 58	1 51	1 46	1 39	1 35	1 33	1 33	1 34	1 35	1 37	1 39	1 41	19
20	3 1	2 40	2 24	2 11	2 2	1 54	1 49	1 41	1 36	1 34	1 33	1 33	1 34	1 35	1 37	1 39	20
21	3 9	2 46	2 29	2 16	2 6	1 58	1 52	1 43	1 37	1 34	1 33	1 33	1 33	1 34	1 35	1 37	21
22	3 17	2 53	2 35	2 20	2 10	2 2	1 55	1 45	1 39	1 35	1 33	1 32	1 33	1 33	1 34	1 35	22
23	3 25	2 59	2 40	2 25	2 14	2 5	1 58	1 47	1 40	1 36	1 34	1 32	1 32	1 33	1 33	1 34	23
24	3 33	3 6	2 46	2 30	2 18	2 8	2 1	1 50	1 42	1 37	1 34	1 32	1 32	1 32	1 33	1 34	24
25	3 41	3 12	2 51	2 35	2 23	2 12	2 4	1 52	1 44	1 38	1 35	1 33	1 32	1 32	1 32	1 33	25
26	3 48	3 18	2 57	2 40	2 27	2 16	2 8	1 55	1 46	1 40	1 36	1 33	1 32	1 31	1 31	1 32	26
27	3 56	3 25	3 2	2 45	2 31	2 20	2 12	1 57	1 48	1 41	1 37	1 34	1 32	1 31	1 31	1 31	27
28	4 3	3 31	3 7	2 49	2 35	2 24	2 15	2 0	1 50	1 43	1 38	1 34	1 32	1 31	1 30	1 31	28
29	4 11	3 37	3 13	2 54	2 39	2 27	2 18	2 2	1 52	1 45	1 39	1 35	1 33	1 32	1 31	1 30	29
30	4 18	3 44	3 19	2 59	2 43	2 31	2 21	2 5	1 54	1 46	1 40	1 36	1 34	1 32	1 31	1 30	30
31	4 26	3 50	3 24	3 4	2 47	2 34	2 24	2 8	1 56	1 48	1 41	1 37	1 34	1 32	1 31	1 30	31
32	4 33	3 56	3 29	3 9	2 51	2 38	2 27	2 11	1 58	1 50	1 43	1 38	1 35	1 33	1 32	1 31	32
33	4 40	4 2	3 35	3 14	2 56	2 42	2 30	2 14	2 0	1 51	1 44	1 39	1 35	1 33	1 32	1 31	33
34	4 47	4 9	3 41	3 18	3 0	2 45	2 33	2 16	2 2	1 53	1 46	1 40	1 36	1 34	1 32	1 31	34
35	4 54	4 15	3 46	3 23	3 4	2 49	2 37	2 18	2 4	1 54	1 47	1 41	1 37	1 34	1 32	1 31	35
36	5 1	4 21	3 51	3 27	3 8	2 53	2 40	2 20	2 7	1 56	1 48	1 42	1 38	1 35	1 33	1 32	36
37	5 9	4 27	3 56	3 32	3 12	2 57	2 43	2 23	2 9	1 58	1 50	1 44	1 39	1 36	1 33	1 32	37
38	5 16	4 33	4 1	3 37	3 16	3 0	2 47	2 26	2 11	2 0	1 52	1 45	1 40	1 37	1 34	1 32	38
39	5 23	4 39	4 6	3 41	3 20	3 4	2 50	2 28	2 13	2 2	1 53	1 46	1 41	1 38	1 34	1 32	39
40	5 30	4 45	4 11	3 46	3 24	3 7	2 54	2 30	2 15	2 4	1 54	1 48	1 43	1 39	1 35	1 33	40
41	5 37	4 51	4 16	3 50	3 28	3 11	2 57	2 32	2 18	2 6	1 56	1 49	1 44	1 40	1 36	1 33	41
42	5 44	4 57	4 21	3 54	3 32	3 15	3 0	2 35	2 20	2 8	1 58	1 50	1 45	1 41	1 37	1 34	42
43	5 51	5 2	4 26	3 59	3 36	3 18	3 3	2 37	2 22	2 10	1 59	1 51	1 46	1 42	1 38	1 34	43
44	5 57	5 7	4 30	4 3	3 40	3 22	3 6	2 41	2 24	2 12	2 1	1 53	1 47	1 43	1 39	1 35	44
46	6 9	5 17	4 39	4 11	3 47	3 29	3 12	2 45	2 28	2 15	2 4	1 55	1 49	1 44	1 40	1 36	46
48	6 21	5 27	4 48	4 19	3 54	3 35	3 18	2 50	2 32	2 18	2 7	1 58	1 51	1 45	1 41	1 38	48
50	6 32	5 37	4 57	4 26	4 1	3 41	3 23	2 55	2 35	2 21	2 10	2 0	1 53	1 47	1 43	1 39	50
52	6 43	5 46	5 6	4 33	4 7	3 46	3 28	2 59	2 39	2 24	2 12	2 2	1 55	1 49	1 44	1 40	52
54	6 54	5 55	5 14	4 40	4 13	3 52	3 33	3 3	2 43	2 27	2 15	2 5	1 57	1 50	1 45	1 41	54
56	7 4	6 4	5 22	4 47	4 19	3 57	3 38	3 7	2 47	2 31	2 18	2 7	1 59	1 52	1 46	1 42	56
58	7 13	6 12	5 29	4 53	4 25	4 2	3 43	3 11	2 50	2 34	2 21	2 9	2 0	1 53	1 47	1 43	58
60	7 22	6 20	5 35	4 58	4 30	4 7	3 47	3 15	2 53	2 37	2 23	2 11	2 2	1 54	1 49	1 44	60
62	7 31	6 27	5 41	5 3	4 35	4 11	3 51	3 19	2 56	2 39	2 25	2 13	2 4	1 56	1 50	1 45	62
64	7 39	6 33	5 47	5 8	4 40	4 15	3 55	3 22	2 59	2 41	2 27	2 15	2 5	1 57	1 51	1 46	64
66	7 46	6 39	5 53	5 13	4 44	4 19	3 59	3 25	3 1	2 43	2 29	2 16	2 6	1 58	1 52	1 47	66
68	7 52	6 45	5 58	5 18	4 48	4 23	4 2	3 28	3 3	2 45	2 30	2 18	2 7	1 59	1 52	1 47	68
70	7 58	6 50	6 3	5 22	4 52	4 26	4 4	3 30	3 5	2 47	2 31	2 19	2 8	2 0	1 53	1 48	70
72	8 4	6 55	6 7	5 26	4 55	4 29	4 7	3 32	3 7	2 48	2 33	2 20	2 9	2 1	1 54	1 48	72
74	8 9	7 0	6 10	5 30	4 58	4 31	4 9	3 34	3 9	2 49	2 34	2 21	2 10	2 2	1 55	1 49	74
76	8 13	7 4	6 14	5 33	5 1	4 33	4 11	3 35	3 11	2 50	2 35	2 22	2 11	2 2	1 56	1 49	76
78	8 16	7 7	6 17	5 36	5 3	4 35	4 12	3 37	3 12	2 51	2 36	2 23	2 12	2 3	1 56	1 50	78
80	8 19	7 10	6 19	5 38	5 5	4 37	4 14	3 38	3 13	2 52	2 37	2 24	2 13	2 4	1 57	1 51	80
82			6 21	5 40	5 7	4 39	4 16	3 39	3 13	2 53	2 38	2 24	2 13	2 4	1 57		82
84					5 9	4 41	4 17	3 40	3 14	2 54	2 38	2 24	2 14	2 5			84
86							4 18	3 41	3 15	2 54	2 38	2 24	2 14				86
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 72°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	4 27	4 41	4 56	5 11	5 38	6 3	6 27	6 48	7 8	7 27	7 42	7 55	8 6	8 16			6
7	3 51	4 3	4 16	4 28	4 51	5 12	5 32	5 51	6 8	6 23	6 36	6 48	6 58	7 7			7
8	3 25	3 36	3 47	3 58	4 18	4 36	4 54	5 11	5 26	5 39	5 51	6 1	6 9	6 16	6 22		8
9	3 4	3 14	3 24	3 33	3 51	4 8	4 23	4 37	4 50	5 1	5 11	5 20	5 28	5 35	5 41		9
10	2 48	2 57	3 6	3 14	3 29	3 44	3 58	4 10	4 22	4 33	4 42	4 51	4 57	5 3	5 7		10
11	2 35	2 43	2 51	2 58	3 11	3 25	3 37	3 48	3 59	4 9	4 17	4 24	4 30	4 35	4 39		11
12	2 21	2 31	2 38	2 45	2 57	3 9	3 20	3 31	3 41	3 49	3 57	4 3	4 8	4 12	4 16	4 20	12
13	2 15	2 21	2 27	2 33	2 45	2 56	3 6	3 16	3 24	3 32	3 39	3 45	3 49	3 53	3 56	3 59	13
14	2 7	2 13	2 18	2 21	2 31	2 44	2 54	3 2	3 10	3 18	3 24	3 29	3 33	3 36	3 39	3 41	14
15	2 1	2 6	2 11	2 16	2 25	2 34	2 43	2 51	2 58	3 5	3 11	3 16	3 20	3 23	3 25	3 27	15
16	1 56	2 1	2 5	2 9	2 18	2 26	2 34	2 41	2 48	2 54	2 59	3 4	3 8	3 11	3 13	3 15	16
17	1 52	1 56	1 59	2 3	2 11	2 19	2 27	2 32	2 39	2 45	2 50	2 54	2 57	3 0	3 2	3 4	17
18	1 48	1 51	1 54	1 58	2 6	2 13	2 19	2 25	2 31	2 37	2 42	2 46	2 48	2 50	2 52	2 54	18
19	1 44	1 47	1 50	1 54	2 1	2 7	2 13	2 19	2 25	2 30	2 35	2 38	2 40	2 42	2 44	2 45	19
20	1 41	1 44	1 47	1 50	1 56	2 2	2 7	2 13	2 19	2 23	2 28	2 31	2 33	2 35	2 36	2 37	20
21	1 39	1 41	1 44	1 46	1 52	1 57	2 2	2 8	2 13	2 17	2 21	2 24	2 26	2 28	2 29	2 30	21
22	1 37	1 39	1 41	1 43	1 48	1 53	1 58	2 3	2 7	2 11	2 15	2 18	2 20	2 22	2 23	2 24	22
23	1 36	1 37	1 39	1 41	1 45	1 50	1 54	1 59	2 2	2 6	2 10	2 13	2 15	2 16	2 17	2 18	23
24	1 35	1 36	1 37	1 39	1 43	1 47	1 51	1 55	1 58	2 2	2 5	2 8	2 10	2 11	2 12	2 13	24
25	1 34	1 35	1 36	1 38	1 41	1 44	1 48	1 51	1 54	1 58	2 1	2 3	2 5	2 6	2 8		25
26	1 33	1 34	1 35	1 36	1 39	1 42	1 45	1 48	1 51	1 54	1 57	1 59	2 1	2 2	2 4		26
27	1 32	1 33	1 34	1 35	1 37	1 40	1 43	1 45	1 48	1 51	1 54	1 56	1 57	1 58	2 0		27
28	1 32	1 32	1 33	1 34	1 35	1 38	1 41	1 43	1 46	1 48	1 51	1 53	1 54	1 55	1 56		28
29	1 31	1 32	1 32	1 33	1 34	1 36	1 39	1 41	1 44	1 46	1 48	1 50	1 52	1 53			29
30	1 31	1 31	1 32	1 32	1 33	1 35	1 37	1 39	1 42	1 44	1 46	1 47	1 49	1 50			30
31	1 30	1 31	1 31	1 31	1 32	1 34	1 36	1 38	1 40	1 42	1 44	1 45	1 46	1 47			31
32	1 29	1 30	1 30	1 30	1 31	1 33	1 35	1 36	1 38	1 40	1 42	1 43	1 44	1 45			32
33	1 29	1 29	1 29	1 30	1 31	1 32	1 33	1 34	1 36	1 38	1 40	1 41	1 42				33
34	1 30	1 29	1 29	1 29	1 30	1 31	1 32	1 33	1 34	1 36	1 38	1 39	1 40				34
35	1 30	1 29	1 29	1 29	1 30	1 30	1 31	1 32	1 33	1 35	1 36	1 37	1 38				35
36	1 31	1 29	1 28	1 28	1 29	1 30	1 31	1 32	1 33	1 34	1 35	1 36	1 36				36
37	1 31	1 30	1 28	1 28	1 29	1 29	1 30	1 31	1 32	1 33	1 34	1 35					37
38	1 31	1 30	1 28	1 27	1 28	1 29	1 30	1 31	1 32	1 33	1 33	1 34					38
39	1 31	1 30	1 29	1 28	1 28	1 28	1 29	1 30	1 31	1 32	1 32	1 32					39
40	1 31	1 30	1 29	1 28	1 27	1 28	1 28	1 29	1 30	1 30	1 30	1 30					40
41	1 31	1 30	1 29	1 28	1 27	1 27	1 27	1 28	1 28	1 29	1 29						41
42	1 32	1 31	1 29	1 28	1 26	1 26	1 26	1 27	1 27	1 28	1 28						42
43	1 32	1 31	1 29	1 28	1 26	1 26	1 26	1 26	1 26	1 27	1 27						43
44	1 33	1 31	1 30	1 28	1 26	1 26	1 25	1 25	1 25	1 26	1 26						44
46	1 34	1 32	1 30	1 29	1 27	1 25	1 25	1 25	1 25	1 25							46
48	1 35	1 32	1 30	1 29	1 27	1 25	1 24	1 24	1 24	1 24							48
50	1 36	1 33	1 31	1 30	1 27	1 25	1 24	1 23	1 23								50
52	1 37	1 34	1 31	1 30	1 27	1 25	1 23	1 22	1 23								52
54	1 37	1 34	1 32	1 31	1 28	1 25	1 23	1 22									54
56	1 38	1 35	1 33	1 31	1 28	1 25	1 23	1 22									56
58	1 39	1 36	1 34	1 32	1 28	1 25	1 23										
60	1 39	1 36	1 34	1 32	1 28	1 25	1 23										
62	1 40	1 37	1 35	1 32	1 28	1 25											
64	1 41	1 38	1 36	1 33	1 28	1 25											
66	1 42	1 38	1 36	1 33	1 28												
68	1 43	1 39	1 36	1 31	1 29												
70	1 43	1 39	1 36	1 31													
72	1 44	1 40	1 36	1 34													
74	1 44	1 40	1 36														
76	1 45	1 40															
78	1 45																
80																	
82																	
84																	
86																	
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°						

TABLE P. EFFECT OF SUN'S PAR.

Add the Numbers above the lines to 3rd Correction, subtract the others.

☽'s App Alt.	Sun's Apparent Altitude.									
	5	10	20	30	40	50	60	70	80	90
	″	″	″	″	″	″	″	″	″	″
5	1	0	0	1	1	2	2	2		
10	2	1	1	0	0	1	1	1	1	
20	3	3	2	2	1	1	1	1	0	0
30	4	4	4	3	3	2	2	2	2	
40	6	6	5	5	4	4	4	3		
50	7	7	6	6	5	5	5			
60	8	8	7	7	6	6				
70	9	8	8	7	7					
80		9	8	8						
90			9							

TABLE XVIII.

Third Correction, to Apparent Distance 76°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	1 37	1 39	1 41	1 44	1 48	1 54	2 0	2 13	2 27	2 42	2 57	3 13	3 28	3 43	3 58	4 13	6
7	1 40	1 37	1 38	1 40	1 43	1 47	1 51	2 1	2 12	2 24	2 37	2 50	3 3	3 15	3 28	3 40	7
8	1 44	1 40	1 37	1 38	1 40	1 42	1 45	1 52	2 2	2 12	2 22	2 33	2 44	2 54	3 5	3 16	8
9	1 49	1 43	1 39	1 37	1 38	1 39	1 41	1 46	1 54	2 2	2 11	2 20	2 30	2 39	2 48	2 58	9
10	1 54	1 46	1 41	1 39	1 37	1 38	1 39	1 42	1 48	1 55	2 2	2 10	2 18	2 26	2 34	2 43	10
11	2 0	1 50	1 44	1 41	1 39	1 37	1 38	1 40	1 44	1 49	1 55	2 2	2 9	2 16	2 23	2 31	11
12	2 6	1 55	1 48	1 44	1 41	1 38	1 37	1 38	1 41	1 45	1 50	1 56	2 2	2 8	2 15	2 21	12
13	2 12	2 6	1 52	1 47	1 43	1 40	1 38	1 37	1 39	1 42	1 46	1 51	1 56	2 2	2 8	2 13	13
14	2 19	2 6	1 56	1 50	1 45	1 42	1 40	1 37	1 38	1 40	1 43	1 47	1 52	1 57	2 2	2 7	14
15	2 26	2 12	2 1	1 54	1 48	1 44	1 42	1 38	1 37	1 39	1 41	1 45	1 49	1 53	1 57	2 1	15
16	2 34	2 18	2 6	1 58	1 51	1 47	1 44	1 39	1 37	1 38	1 40	1 43	1 46	1 49	1 53	1 56	16
17	2 41	2 24	2 11	2 2	1 54	1 49	1 46	1 40	1 38	1 37	1 39	1 41	1 43	1 46	1 49	1 52	17
18	2 49	2 30	2 17	2 6	1 58	1 52	1 48	1 42	1 39	1 36	1 38	1 39	1 41	1 43	1 46	1 49	18
19	2 57	2 36	2 22	2 10	2 2	1 55	1 50	1 43	1 40	1 37	1 37	1 38	1 39	1 41	1 43	1 46	19
20	3 5	2 43	2 27	2 15	2 6	1 58	1 52	1 45	1 41	1 38	1 36	1 37	1 38	1 39	1 41	1 43	20
21	3 12	2 49	2 33	2 20	2 10	2 2	1 55	1 47	1 42	1 39	1 37	1 36	1 37	1 38	1 39	1 41	21
22	3 20	2 56	2 38	2 24	2 14	2 5	1 58	1 49	1 44	1 40	1 38	1 36	1 36	1 37	1 38	1 39	22
23	3 28	3 3	2 44	2 29	2 18	2 9	2 1	1 51	1 45	1 41	1 38	1 36	1 35	1 36	1 37	1 38	23
24	3 36	3 9	2 49	2 34	2 22	2 12	2 4	1 54	1 47	1 42	1 39	1 37	1 35	1 36	1 36	1 37	24
25	3 44	3 15	2 54	2 39	2 26	2 16	2 7	1 56	1 49	1 44	1 40	1 37	1 36	1 36	1 36	1 37	25
26	3 51	3 21	3 0	2 44	2 30	2 20	2 11	1 59	1 51	1 45	1 41	1 38	1 36	1 35	1 35	1 36	26
27	3 59	3 28	3 5	2 49	2 34	2 23	2 14	2 2	1 53	1 47	1 42	1 39	1 37	1 36	1 35	1 35	27
28	4 6	3 34	3 10	2 54	2 38	2 27	2 17	2 4	1 54	1 48	1 43	1 39	1 37	1 36	1 35	1 35	28
29	4 13	3 40	3 15	2 58	2 42	2 31	2 21	2 7	1 56	1 49	1 44	1 40	1 38	1 36	1 35	1 34	29
30	4 20	3 46	3 21	3 3	2 47	2 34	2 24	2 9	1 58	1 51	1 45	1 41	1 39	1 37	1 35	1 34	30
31	4 27	3 52	3 26	3 7	2 51	2 38	2 28	2 12	2 0	1 52	1 46	1 42	1 39	1 37	1 35	1 34	31
32	4 34	3 58	3 31	3 12	2 55	2 42	2 31	2 14	2 2	1 54	1 48	1 43	1 40	1 38	1 36	1 35	32
33	4 41	4 4	3 37	3 16	2 59	2 45	2 34	2 17	2 4	1 55	1 49	1 44	1 41	1 38	1 36	1 35	33
34	4 48	4 10	3 42	3 20	3 3	2 49	2 37	2 19	2 6	1 57	1 50	1 45	1 42	1 39	1 37	1 35	34
35	4 55	4 16	3 47	3 25	3 7	2 52	2 41	2 22	2 8	1 59	1 52	1 46	1 42	1 39	1 37	1 35	35
36	5 2	4 22	3 53	3 29	3 11	2 56	2 44	2 24	2 11	2 1	1 53	1 47	1 43	1 40	1 38	1 36	36
37	5 9	4 27	3 58	3 34	3 15	3 0	2 47	2 27	2 13	2 3	1 55	1 48	1 44	1 41	1 38	1 36	37
38	5 16	4 33	4 3	3 38	3 19	3 3	2 50	2 29	2 15	2 4	1 56	1 49	1 45	1 42	1 39	1 37	38
39	5 23	4 38	4 8	3 43	3 23	3 7	2 53	2 31	2 17	2 6	1 58	1 51	1 46	1 42	1 39	1 37	39
40	5 30	4 44	4 13	3 47	3 27	3 10	2 56	2 34	2 19	2 8	1 59	1 52	1 47	1 43	1 40	1 38	40
41	5 37	4 50	4 18	3 51	3 31	3 14	2 59	2 36	2 22	2 10	2 0	1 53	1 48	1 44	1 41	1 38	41
42	5 43	4 55	4 23	3 55	3 34	3 17	3 2	2 39	2 24	2 12	2 1	1 54	1 49	1 45	1 42	1 39	42
43	5 49	5 1	4 28	3 59	3 38	3 20	3 5	2 41	2 26	2 14	2 3	1 56	1 50	1 46	1 43	1 40	43
44	5 55	5 6	4 33	4 3	3 41	3 24	3 8	2 44	2 28	2 15	2 4	1 57	1 51	1 47	1 43	1 40	44
46	6 7	5 16	4 42	4 11	3 49	3 31	3 14	2 49	2 32	2 18	2 7	1 59	1 53	1 48	1 44	1 41	46
48	6 19	5 26	4 51	4 19	3 56	3 37	3 20	2 54	2 35	2 21	2 10	2 2	1 55	1 50	1 46	1 43	48
50	6 30	5 36	4 59	4 27	4 3	3 43	3 25	2 58	2 39	2 25	2 13	2 4	1 57	1 51	1 47	1 44	50
52	6 41	5 46	5 7	4 34	4 10	3 49	3 30	3 3	2 43	2 28	2 16	2 6	1 59	1 53	1 49	1 45	52
54	6 51	5 55	5 15	4 41	4 17	3 55	3 35	3 7	2 47	2 31	2 19	2 9	2 1	1 55	1 50	1 46	54
56	7 1	6 4	5 22	4 48	4 23	4 0	3 40	3 11	2 50	2 34	2 22	2 12	2 3	1 56	1 51	1 47	56
58	7 11	6 12	5 29	4 54	4 28	4 5	3 45	3 15	2 53	2 37	2 25	2 14	2 5	1 57	1 52	1 48	58
60	7 20	6 20	5 36	5 0	4 33	4 9	3 49	3 19	2 56	2 40	2 27	2 16	2 6	1 59	1 53	1 49	60
62	7 28	6 27	5 42	5 5	4 37	4 14	3 53	3 22	2 59	2 43	2 29	2 18	2 8	2 0	1 54	1 50	62
64	7 36	6 34	5 48	5 10	4 41	4 18	3 57	3 25	3 2	2 45	2 31	2 20	2 10	2 2	1 56	1 51	64
66	7 43	6 40	5 54	5 15	4 45	4 22	4 1	3 28	3 5	2 47	2 33	2 21	2 11	2 3	1 57	1 52	66
68	7 49	6 45	5 59	5 19	4 49	4 26	4 5	3 31	3 8	2 49	2 35	2 23	2 13	2 4	1 58	1 53	68
70	7 55	6 50	6 3	5 23	4 53	4 29	4 8	3 34	3 10	2 51	2 36	2 24	2 14	2 5	1 58	1 53	70
72	8 1	6 54	6 7	5 27	4 57	4 32	4 11	3 37	3 12	2 52	2 37	2 25	2 15	2 6	1 59	1 54	72
74	8 6	6 58	6 10	5 30	5 0	4 34	4 13	3 39	3 13	2 53	2 38	2 26	2 16	2 7	2 0	1 54	74
76	8 11	7 2	6 13	5 33	5 3	4 36	4 15	3 41	3 14	2 54	2 39	2 26	2 16	2 7	2 1	1 55	76
78	8 15	7 6	6 16	5 36	5 5	4 38	4 17	3 42	3 15	2 55	2 40	2 27	2 17	2 8	2 1		78
80	8 18	7 9	6 19	5 38	5 7	4 40	4 19	3 43	3 16	2 56	2 40	2 28	2 18	2 9			80
82	8 20	7 11	6 21	5 40	5 9	4 42	4 20	3 44	3 17	2 57	2 41	2 28	2 18				82
84	8 22	7 13	6 23	5 42	5 10	4 43	4 21	3 45	3 18	2 58	2 41	2 28					84
86			6 25	5 44	5 11	4 44	4 22	3 45	3 18	2 58	2 42						86
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 76°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	4 28	4 42	4 57	5 11	5 37	6 2	6 26	6 47	7 6	7 24	7 40	7 54	8 5	8 13	8 20		6
7	3 53	4 5	4 17	4 29	4 52	5 13	5 33	5 52	6 0	6 24	6 37	6 48	6 57	7 5	7 12		7
8	3 27	3 38	3 49	3 59	4 19	4 38	4 56	5 12	5 26	5 39	5 51	6 1	6 9	6 16	6 21	6 26	8
9	3 8	3 17	3 26	3 35	3 52	4 8	4 24	4 38	4 51	5 3	5 13	5 22	5 29	5 35	5 40	5 44	9
10	2 52	3 0	3 8	3 16	3 31	3 46	4 1	4 14	4 25	4 35	4 44	4 52	4 59	5 4	5 8	5 11	10
11	2 39	2 46	2 53	3 0	3 14	3 27	3 40	3 51	4 2	4 12	4 20	4 27	4 33	4 38	4 42	4 45	11
12	2 28	2 34	2 41	2 47	3 0	3 12	3 23	3 34	3 43	3 52	4 0	4 6	4 11	4 15	4 19	4 22	12
13	2 19	2 25	2 30	2 36	2 48	2 59	3 9	3 19	3 28	3 36	3 43	3 48	3 53	3 57	4 0	4 2	13
14	2 12	2 17	2 22	2 27	2 38	2 48	2 58	3 6	3 14	3 22	3 28	3 33	3 37	3 41	3 43	3 45	14
15	2 5	2 10	2 15	2 19	2 29	2 38	2 47	2 55	3 3	3 9	3 15	3 20	3 24	3 27	3 29	3 31	15
16	2 0	2 4	2 9	2 13	2 21	2 29	2 37	2 45	2 52	2 58	3 4	3 8	3 12	3 15	3 17	3 19	16
17	1 56	1 59	2 3	2 7	2 14	2 22	2 29	2 36	2 43	2 49	2 54	2 58	3 2	3 4	3 6	3 8	17
18	1 52	1 55	1 58	2 2	2 9	2 16	2 23	2 30	2 36	2 42	2 46	2 50	2 53	2 55	2 57	2 58	18
19	1 49	1 51	1 54	1 58	2 4	2 11	2 17	2 24	2 30	2 35	2 39	2 42	2 45	2 47	2 49	2 50	19
20	1 46	1 48	1 51	1 54	2 0	2 6	2 12	2 18	2 24	2 28	2 32	2 35	2 37	2 39	2 41	2 42	20
21	1 43	1 45	1 48	1 51	1 56	2 2	2 7	2 13	2 18	2 22	2 26	2 29	2 31	2 33	2 34		21
22	1 41	1 43	1 46	1 48	1 53	1 58	2 3	2 8	2 13	2 17	2 20	2 23	2 25	2 27	2 28		22
23	1 40	1 42	1 44	1 46	1 50	1 55	1 59	2 3	2 8	2 12	2 15	2 17	2 19	2 21	2 23		23
24	1 39	1 40	1 42	1 44	1 48	1 52	1 56	1 59	2 4	2 7	2 10	2 12	2 14	2 16	2 18		24
25	1 38	1 39	1 40	1 42	1 46	1 49	1 53	1 56	2 0	2 3	2 6	2 8	2 10	2 12			25
26	1 37	1 38	1 39	1 41	1 44	1 47	1 50	1 53	1 56	1 59	2 2	2 4	2 6	2 8			26
27	1 36	1 37	1 38	1 40	1 42	1 45	1 48	1 50	1 53	1 56	1 59	2 1	2 3	2 5			27
28	1 36	1 37	1 38	1 39	1 41	1 43	1 46	1 48	1 50	1 53	1 56	1 58	2 0	2 2			28
29	1 35	1 36	1 37	1 38	1 40	1 42	1 44	1 46	1 48	1 50	1 53	1 55	1 57				29
30	1 35	1 35	1 36	1 37	1 38	1 40	1 42	1 44	1 46	1 48	1 50	1 52	1 54				30
31	1 34	1 34	1 35	1 36	1 37	1 39	1 40	1 42	1 44	1 46	1 48	1 50	1 52				31
32	1 34	1 34	1 34	1 35	1 36	1 38	1 39	1 41	1 43	1 44	1 46	1 48	1 50				32
33	1 34	1 33	1 34	1 35	1 35	1 37	1 38	1 40	1 42	1 43	1 45	1 46					33
34	1 34	1 33	1 33	1 34	1 35	1 36	1 37	1 39	1 41	1 42	1 44	1 45					34
35	1 34	1 33	1 33	1 33	1 34	1 35	1 36	1 38	1 39	1 40	1 42	1 43					35
36	1 35	1 34	1 33	1 33	1 33	1 34	1 35	1 37	1 38	1 39	1 40	1 41					36
37	1 35	1 34	1 33	1 32	1 33	1 33	1 34	1 36	1 37	1 38	1 39						37
38	1 35	1 34	1 33	1 32	1 32	1 33	1 34	1 35	1 36	1 37	1 38						38
39	1 36	1 34	1 33	1 32	1 32	1 33	1 33	1 34	1 35	1 36	1 36						39
40	1 36	1 35	1 34	1 33	1 32	1 32	1 33	1 34	1 34	1 35	1 35						40
41	1 37	1 35	1 34	1 33	1 32	1 32	1 32	1 33	1 33	1 34							41
42	1 37	1 35	1 34	1 33	1 31	1 31	1 32	1 32	1 33	1 33							42
43	1 37	1 35	1 34	1 33	1 31	1 30	1 31	1 31	1 32	1 32							43
44	1 38	1 36	1 34	1 33	1 31	1 30	1 30	1 31	1 31	1 31							44
46	1 39	1 37	1 35	1 34	1 31	1 29	1 29	1 30	1 30								46
48	1 40	1 38	1 36	1 34	1 31	1 29	1 29	1 29	1 29								48
50	1 41	1 38	1 37	1 35	1 32	1 30	1 29	1 29									50
52	1 42	1 39	1 37	1 35	1 32	1 30	1 29	1 28									52
54	1 43	1 40	1 38	1 36	1 33	1 30	1 29										54
56	1 44	1 41	1 38	1 36	1 33	1 30	1 29										56
58	1 45	1 42	1 39	1 37	1 33	1 30											
60	1 46	1 43	1 40	1 37	1 33	1 30											
62	1 46	1 43	1 40	1 37	1 33												
64	1 47	1 44	1 41	1 38	1 33												
66	1 48	1 44	1 41	1 38													
68	1 49	1 45	1 41	1 38													
70	1 49	1 45	1 41														
72	1 49	1 45															
74	1 50																
76																	
78																	
80																	
82																	
84																	
86																	
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°						

TABLE P. EFFECT OF SUN's PAR.

Add the Numbers above the lines to 3rd Correction, subtract the others.

☽'s App Alt.	Sun's Apparent Altitude.									
	5	10	20	30	40	50	60	70	80	90
	″	″	″	″	″	″	″	″	″	″
5	1	1	0	0	1	1	1	1	1	
10	1	1	1	0	0	0	0	0	1	
15	2	2	2	1	1	0	0	0	0	0
20	3	3	2	2	2	1	1	1	1	
25	4	4	3	3	2	2	2	2	2	
30	4	4	4	3	3	3	3	3		
35	5	5	4	4	4	4	3	3		
40	6	6	5	5	4	4	4			
45	6	6	6	5	5	5	5			
50	7	7	6	6	6	5				
55	7	7	7	6	6	6				
60	8	8	7	7	7					
65	8	8	8	7	7					
70	8	8	6	8						
75	9	9	8	8						
80	9	9	8							
90		9	8							

TABLE XVIII

Third Correction, to Apparent Distance 80°.

☽'s App Alt	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	1 41	1 43	1 46	1 50	1 54	1 59	2 4	2 17	2 32	2 47	3 2	3 17	3 32	3 47	4 2	4 16	6
7	1 44	1 41	1 43	1 45	1 48	1 51	1 55	2 5	2 17	2 29	2 41	2 54	3 6	3 19	3 31	3 44	7
8	1 48	1 43	1 41	1 42	1 44	1 46	1 49	1 56	2 6	2 16	2 26	2 37	2 48	2 59	3 10	3 20	8
9	1 52	1 46	1 43	1 41	1 42	1 44	1 46	1 51	1 58	2 6	2 15	2 25	2 34	2 43	2 52	3 1	9
10	1 57	1 50	1 46	1 43	1 41	1 42	1 44	1 47	1 53	1 59	2 6	2 14	2 22	2 30	2 38	2 46	10
11	2 3	1 54	1 49	1 45	1 43	1 41	1 42	1 45	1 49	1 54	1 59	2 6	2 13	2 20	2 27	2 34	11
12	2 9	1 59	1 52	1 48	1 45	1 43	1 41	1 43	1 46	1 50	1 54	2 0	2 6	2 12	2 19	2 25	12
13	2 16	2 4	1 56	1 51	1 48	1 45	1 42	1 42	1 44	1 47	1 51	1 56	2 1	2 6	2 12	2 18	13
14	2 23	2 10	2 0	1 54	1 50	1 47	1 44	1 41	1 43	1 45	1 48	1 52	1 57	2 2	2 7	2 12	14
15	2 30	2 16	2 5	1 58	1 53	1 49	1 46	1 42	1 42	1 44	1 46	1 49	1 53	1 58	2 2	2 7	15
16	2 37	2 22	2 10	2 2	1 56	1 52	1 48	1 43	1 41	1 43	1 45	1 47	1 50	1 54	1 58	2 2	16
17	2 45	2 28	2 15	2 6	1 59	1 54	1 50	1 45	1 42	1 42	1 43	1 45	1 48	1 51	1 54	1 58	17
18	2 53	2 34	2 21	2 11	2 3	1 57	1 52	1 47	1 43	1 41	1 42	1 44	1 46	1 48	1 51	1 54	18
19	3 0	2 41	2 26	2 15	2 7	2 0	1 54	1 48	1 44	1 42	1 41	1 43	1 44	1 46	1 49	1 51	19
20	3 8	2 47	2 31	2 20	2 10	2 3	1 57	1 50	1 46	1 43	1 41	1 42	1 43	1 45	1 47	1 49	20
21	3 16	2 54	2 37	2 24	2 14	2 6	1 59	1 52	1 47	1 44	1 42	1 41	1 42	1 43	1 45	1 47	21
22	3 23	3 0	2 43	2 29	2 18	2 9	2 2	1 54	1 49	1 45	1 42	1 40	1 41	1 42	1 43	1 45	22
23	3 31	3 6	2 47	2 33	2 22	2 13	2 5	1 57	1 51	1 47	1 43	1 41	1 40	1 41	1 42	1 44	23
24	3 38	3 12	2 53	2 38	2 25	2 16	2 8	1 59	1 52	1 48	1 44	1 41	1 40	1 41	1 42	1 43	24
25	3 46	3 18	2 58	2 42	2 29	2 19	2 12	2 1	1 54	1 49	1 45	1 42	1 40	1 40	1 41	1 42	25
26	3 53	3 24	3 4	2 47	2 33	2 23	2 15	2 3	1 55	1 50	1 46	1 43	1 41	1 40	1 41	1 42	26
27	4 1	3 31	3 10	2 52	2 37	2 26	2 19	2 6	1 57	1 51	1 47	1 43	1 41	1 40	1 40	1 41	27
28	4 8	3 37	3 15	2 56	2 41	2 30	2 22	2 8	1 59	1 53	1 48	1 44	1 42	1 41	1 40	1 40	28
29	4 15	3 43	3 20	3 1	2 46	2 34	2 26	2 11	2 1	1 55	1 49	1 45	1 43	1 41	1 40	1 39	29
30	4 22	3 49	3 25	3 5	2 50	2 38	2 29	2 14	2 3	1 56	1 50	1 46	1 44	1 42	1 40	1 39	30
31	4 29	3 55	3 30	3 10	2 54	2 41	2 32	2 17	2 5	1 58	1 52	1 47	1 44	1 42	1 40	1 39	31
32	4 36	4 1	3 35	3 14	2 58	2 45	2 35	2 19	2 7	1 59	1 53	1 48	1 45	1 43	1 41	1 39	32
33	4 43	4 7	3 40	3 19	3 2	2 49	2 38	2 22	2 9	2 1	1 54	1 49	1 46	1 44	1 42	1 40	33
34	4 50	4 12	3 45	3 23	3 6	2 52	2 41	2 24	2 11	2 2	1 56	1 50	1 47	1 44	1 42	1 40	34
35	4 57	4 18	3 50	3 28	3 10	2 56	2 44	2 27	2 14	2 4	1 57	1 51	1 47	1 44	1 42	1 40	35
36	5 4	4 24	3 55	3 32	3 14	3 0	2 47	2 29	2 16	2 6	1 58	1 52	1 48	1 45	1 43	1 41	36
37	5 11	4 29	4 0	3 37	3 19	3 3	2 50	2 32	2 18	2 8	2 0	1 53	1 49	1 46	1 44	1 42	37
38	5 18	4 35	4 5	3 42	3 23	3 7	2 54	2 34	2 20	2 9	2 1	1 54	1 49	1 46	1 44	1 42	38
39	5 25	4 41	4 10	3 46	3 27	3 11	2 58	2 36	2 22	2 10	2 2	1 55	1 50	1 47	1 45	1 43	39
40	5 31	4 47	4 15	3 50	3 31	3 14	3 1	2 38	2 24	2 12	2 4	1 57	1 51	1 47	1 45	1 43	40
41	5 38	4 52	4 20	3 54	3 35	3 18	3 4	2 41	2 26	2 14	2 5	1 58	1 52	1 48	1 46	1 44	41
42	5 44	4 57	4 25	3 58	3 38	3 21	3 7	2 44	2 28	2 16	2 7	1 59	1 53	1 49	1 46	1 44	42
43	5 51	5 3	4 30	4 2	3 42	3 25	3 10	2 46	2 30	2 17	2 8	2 1	1 55	1 50	1 47	1 45	43
44	5 57	5 8	4 35	4 6	3 46	3 28	3 13	2 48	2 32	2 19	2 10	2 2	1 56	1 51	1 48	1 45	44
46	6 9	5 18	4 44	4 14	3 53	3 35	3 19	2 53	2 36	2 23	2 13	2 4	1 58	1 53	1 49	1 46	46
48	6 20	5 28	4 53	4 22	4 0	3 41	3 25	2 58	2 39	2 26	2 15	2 7	2 0	1 55	1 51	1 48	48
50	6 31	5 38	5 1	4 30	4 6	3 47	3 30	3 3	2 43	2 29	2 18	2 9	2 2	1 56	1 52	1 49	50
52	6 41	5 47	5 9	4 37	4 12	3 53	3 35	3 7	2 47	2 32	2 21	2 12	2 4	1 58	1 54	1 50	52
54	6 51	5 56	5 17	4 44	4 18	3 58	3 39	3 11	2 51	2 35	2 24	2 14	2 6	1 59	1 55	1 52	54
56	7 1	6 5	5 24	4 50	4 24	4 3	3 44	3 15	2 54	2 38	2 26	2 17	2 8	2 1	1 57	1 53	56
58	7 11	6 14	5 31	4 56	4 30	4 8	3 49	3 19	2 57	2 41	2 29	2 19	2 10	2 3	1 58	1 54	58
60	7 20	6 22	5 38	5 2	4 35	4 13	3 54	3 23	3 0	2 44	2 31	2 21	2 12	2 5	1 59	1 55	60
62	7 28	6 29	5 44	5 7	4 40	4 18	3 58	3 27	3 3	2 47	2 33	2 22	2 13	2 6	2 0	1 56	62
64	7 36	6 35	5 50	5 12	4 44	4 22	4 2	3 31	3 6	2 49	2 35	2 24	2 15	2 7	2 1	1 56	64
66	7 43	6 41	5 55	5 17	4 49	4 26	4 6	3 34	3 9	2 51	2 37	2 26	2 16	2 8	2 2	1 57	66
68	7 49	6 46	6 0	5 21	4 53	4 30	4 9	3 37	3 12	2 53	2 39	2 27	2 17	2 9	2 3	1 58	68
70	7 55	6 51	6 5	5 25	4 57	4 33	4 12	3 39	3 14	2 55	2 41	2 29	2 19	2 10	2 4	1 59	70
72	8 0	6 55	6 9	5 29	5 0	4 36	4 14	3 41	3 16	2 57	2 42	2 30	2 20	2 11	2 5	2 0	72
74	8 5	6 59	6 13	5 32	5 3	4 38	4 16	3 43	3 18	2 58	2 43	2 31	2 21	2 12	2 5		74
76	8 9	7 3	6 16	5 35	5 6	4 40	4 18	3 44	3 19	2 59	2 44	2 32	2 22	2 13			76
78	8 13	7 6	6 19	5 37	5 8	4 42	4 19	3 45	3 20	3 0	2 45	2 32	2 22				78
80	8 16	7 9	6 21	5 40	5 10	4 44	4 21	3 46	3 21	3 1	2 45	2 33					80
82	8 19	7 12	6 23	5 42	5 12	4 45	4 22	3 47	3 22	3 2	2 46						82
84	8 22	7 14	6 25	5 44	5 13	4 46	4 23	3 48	3 23	3 3							84
86	8 24	7 16	6 27	5 46	5 14	4 47	4 24	3 49	3 24								86
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 80°.

D's App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																D's App Alt.
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	4 30	4 44	4 58	5 12	5 39	6 4	6 28	6 49	7 8	7 26	7 41	7 54	8 5	8 13	8 19	8 24	6
7	3 56	4 8	4 19	4 30	4 52	5 14	5 35	5 54	6 11	6 26	6 39	6 50	6 59	7 6	7 12	7 16	7
8	3 31	3 41	3 52	4 2	4 23	4 42	4 59	5 15	5 29	5 42	5 54	6 4	6 12	6 18	6 23	6 27	8
9	3 11	3 21	3 30	3 39	3 56	4 12	4 28	4 42	4 54	5 5	5 15	5 24	5 32	5 38	5 43	5 46	9
10	2 54	3 3	3 12	3 20	3 35	3 50	4 4	4 16	4 28	4 39	4 48	4 56	5 2	5 7	5 11	5 14	10
11	2 42	2 49	2 57	3 5	3 19	3 32	3 44	3 56	4 7	4 16	4 24	4 31	4 36	4 41	4 45	4 47	11
12	2 32	2 38	2 45	2 52	3 5	3 17	3 28	3 38	3 48	3 57	4 5	4 11	4 15	4 19	4 22	4 25	12
13	2 24	2 30	2 36	2 42	2 53	3 4	3 14	3 23	3 32	3 40	3 47	3 53	3 57	4 1	4 4	4 6	13
14	2 18	2 23	2 28	2 33	2 43	2 53	3 2	3 11	3 19	3 26	3 32	3 38	3 42	3 46	3 48	3 49	14
15	2 12	2 16	2 21	2 25	2 34	2 43	2 52	3 0	3 7	3 13	3 19	3 25	3 29	3 32	3 34	3 36	15
16	2 6	2 10	2 14	2 18	2 26	2 34	2 42	2 50	2 56	3 2	3 8	3 13	3 17	3 20	3 22	3 24	16
17	2 1	2 4	2 8	2 12	2 20	2 27	2 34	2 41	2 47	2 53	2 58	3 3	3 6	3 9	3 11		17
18	1 57	2 0	2 3	2 7	2 14	2 21	2 28	2 34	2 40	2 46	2 50	2 54	2 57	3 0	3 2		18
19	1 54	1 56	1 59	2 2	2 9	2 16	2 22	2 28	2 34	2 39	2 43	2 47	2 50	2 52	2 53		19
20	1 51	1 53	1 56	1 58	2 5	2 11	2 17	2 22	2 28	2 33	2 37	2 40	2 43	2 45	2 46		20
21	1 49	1 51	1 53	1 55	2 1	2 7	2 12	2 17	2 22	2 27	2 31	2 34	2 37	2 38			21
22	1 47	1 49	1 51	1 53	1 58	2 3	2 8	2 13	2 17	2 21	2 25	2 28	2 31	2 32			22
23	1 46	1 47	1 49	1 51	1 55	2 0	2 4	2 9	2 13	2 17	2 20	2 23	2 26	2 27			23
24	1 45	1 46	1 47	1 49	1 53	1 57	2 1	2 5	2 9	2 13	2 16	2 19	2 21	2 22			24
25	1 44	1 45	1 46	1 48	1 51	1 54	1 58	2 1	2 5	2 9	2 12	2 14	2 16				25
26	1 43	1 44	1 45	1 46	1 49	1 52	1 55	1 58	2 2	2 5	2 8	2 10	2 12				26
27	1 42	1 43	1 44	1 45	1 47	1 50	1 53	1 56	1 59	2 2	2 5	2 7	2 8				27
28	1 41	1 42	1 43	1 44	1 46	1 48	1 51	1 54	1 57	1 59	2 2	2 4	2 5				28
29	1 40	1 41	1 41	1 42	1 44	1 46	1 49	1 52	1 55	1 57	1 59	2 1					29
30	1 39	1 40	1 40	1 41	1 43	1 45	1 48	1 51	1 53	1 55	1 57	1 59					30
31	1 39	1 40	1 40	1 41	1 42	1 44	1 46	1 49	1 51	1 53	1 55	1 57					31
32	1 39	1 39	1 39	1 40	1 41	1 43	1 45	1 47	1 49	1 51	1 53	1 55					32
33	1 39	1 39	1 39	1 40	1 41	1 42	1 44	1 46	1 48	1 49	1 51						33
34	1 39	1 39	1 39	1 40	1 41	1 42	1 43	1 45	1 47	1 48	1 49						34
35	1 39	1 39	1 39	1 39	1 40	1 41	1 42	1 44	1 45	1 46	1 47						35
36	1 40	1 39	1 39	1 39	1 40	1 41	1 42	1 43	1 44	1 45	1 46						36
37	1 41	1 40	1 39	1 38	1 39	1 40	1 41	1 42	1 43	1 44							37
38	1 41	1 40	1 39	1 38	1 39	1 40	1 41	1 42	1 42	1 43							38
39	1 41	1 40	1 39	1 38	1 39	1 39	1 40	1 41	1 41	1 42							39
40	1 41	1 40	1 39	1 38	1 38	1 38	1 39	1 40	1 40	1 41							40
41	1 42	1 41	1 40	1 39	1 38	1 38	1 38	1 39	1 39								41
42	1 42	1 41	1 40	1 39	1 37	1 37	1 37	1 38	1 38								42
43	1 43	1 41	1 40	1 39	1 37	1 37	1 37	1 37	1 38								43
44	1 43	1 42	1 40	1 39	1 37	1 37	1 36	1 37	1 37								44
46	1 44	1 42	1 41	1 40	1 38	1 37	1 36	1 36									46
48	1 45	1 43	1 41	1 40	1 38	1 37	1 36	1 36									48
50	1 46	1 44	1 42	1 41	1 38	1 36	1 36										50
52	1 47	1 45	1 43	1 41	1 38	1 36	1 35										52
54	1 48	1 46	1 44	1 42	1 38	1 36											54
56	1 49	1 47	1 44	1 42	1 38	1 36											56
58	1 50	1 47	1 45	1 42	1 38												
60	1 51	1 48	1 45	1 43	1 38												
62	1 52	1 49	1 46	1 43													
64	1 52	1 49	1 46	1 43													
66	1 53	1 49	1 46														
68	1 51	1 50															
70	1 55																
72																	
74																	
76																	
78																	
80																	
82																	
84																	
86																	
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°						

TABLE *P*. EFFECT OF SUN's PAR.

Add the Numbers above the lines to 3rd Correction, subtract the others.

D's App Alt.	Sun's Apparent Altitude.									
	5	10	20	30	40	50	60	70	80	90
	″	′	″	″	″	″	″	″	″	″
5	1	1	1			1	1	1	1	
10	1	1	1	1	1	0	0	0	0	
15	2	2	2	2	1	1	1	1	1	0
20	3	3	3	2	2	2	2	2	2	
25	4	4	3	3	3	3	3	2		
30	4	4	4	4	4	3	3	3		
35	5	5	5	4	4	4	4			
40	6	6	5	5	5	5	4			
45	6	6	6	6	5	5				
50	7	7	6	6	6	6				
55	7	7	7	7	6					
60	8	8	7	7	7					
65	8	8	8	8						
70	8	8	8	8						
75	9	9	8							
80	9	9	8							
90		9								

TABLE XVIII.

THIRD CORRECTION to APPARENT DISTANCE 84°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	1 47	1 49	1 51	1 54	1 59	2 4	2 10	2 22	2 36	2 50	3 5	3 20	3 35	3 50	4 5	4 20	6
7	1 50	1 47	1 48	1 50	1 53	1 56	2 0	2 10	2 21	2 33	2 45	2 57	3 10	3 23	3 35	3 48	7
8	1 53	1 49	1 47	1 48	1 50	1 52	1 55	2 2	2 11	2 21	2 31	2 42	2 53	3 3	3 14	3 25	8
9	1 57	1 52	1 49	1 47	1 48	1 50	1 52	1 57	2 4	2 12	2 21	2 30	2 39	2 48	2 58	3 7	9
10	2 2	1 55	1 51	1 49	1 47	1 48	1 50	1 53	1 59	2 5	2 12	2 20	2 27	2 35	2 44	2 52	10
11	2 8	1 59	1 54	1 51	1 49	1 47	1 48	1 51	1 55	1 59	2 5	2 12	2 18	2 26	2 33	2 41	11
12	2 14	2 4	1 57	1 53	1 51	1 48	1 47	1 49	1 52	1 55	1 59	2 5	2 11	2 18	2 25	2 31	12
13	2 20	2 9	2 1	1 56	1 53	1 50	1 48	1 48	1 50	1 52	1 55	2 0	2 6	2 11	2 17	2 23	13
14	2 27	2 14	2 5	1 59	1 55	1 52	1 50	1 47	1 48	1 50	1 53	1 57	2 2	2 6	2 11	2 16	14
15	2 34	2 20	2 10	2 3	1 58	1 54	1 51	1 48	1 47	1 49	1 51	1 54	1 58	2 2	2 7	2 11	15
16	2 42	2 26	2 15	2 7	2 1	1 56	1 53	1 49	1 47	1 48	1 50	1 52	1 55	1 59	2 3	2 7	16
17	2 49	2 32	2 20	2 11	2 4	1 59	1 55	1 50	1 48	1 47	1 48	1 50	1 53	1 56	2 0	2 3	17
18	2 57	2 38	2 25	2 16	2 8	2 2	1 57	1 52	1 49	1 46	1 47	1 49	1 51	1 54	1 57	2 0	18
19	3 4	2 44	2 31	2 20	2 12	2 5	1 59	1 53	1 50	1 47	1 46	1 48	1 49	1 52	1 54	1 57	19
20	3 12	2 50	2 36	2 25	2 15	2 8	2 2	1 55	1 51	1 48	1 46	1 47	1 48	1 50	1 52	1 55	20
21	3 20	2 57	2 42	2 29	2 19	2 11	2 5	1 57	1 52	1 49	1 47	1 46	1 47	1 48	1 50	1 52	21
22	3 27	3 3	2 47	2 34	2 23	2 14	2 8	1 59	1 54	1 50	1 47	1 46	1 46	1 47	1 49	1 50	22
23	3 35	3 9	2 52	2 38	2 27	2 18	2 11	2 1	1 56	1 52	1 48	1 46	1 46	1 47	1 48	1 49	23
24	3 42	3 15	2 57	2 42	2 30	2 21	2 14	2 3	1 57	1 53	1 49	1 46	1 46	1 46	1 47	1 48	24
25	3 49	3 21	3 3	2 47	2 34	2 25	2 17	2 6	1 59	1 54	1 50	1 47	1 46	1 46	1 46	1 47	25
26	3 56	3 27	3 8	2 52	2 38	2 28	2 20	2 8	2 0	1 55	1 51	1 48	1 47	1 46	1 46	1 46	26
27	4 4	3 34	3 13	2 56	2 42	2 32	2 24	2 11	2 2	1 56	1 52	1 49	1 47	1 46	1 45	1 46	27
28	4 11	3 40	3 18	3 1	2 46	2 35	2 27	2 13	2 4	1 58	1 53	1 49	1 47	1 46	1 45	1 45	28
29	4 19	3 47	3 24	3 5	2 51	2 39	2 30	2 16	2 6	1 59	1 54	1 50	1 48	1 46	1 45	1 45	29
30	4 26	3 53	3 29	3 10	2 55	2 43	2 33	2 18	2 8	2 1	1 55	1 51	1 49	1 47	1 46	1 45	30
31	4 33	3 59	3 35	3 14	2 59	2 46	2 36	2 21	2 10	2 3	1 57	1 52	1 49	1 47	1 46	1 45	31
32	4 40	4 5	3 40	3 19	3 3	2 50	2 39	2 24	2 12	2 4	1 58	1 53	1 50	1 48	1 46	1 45	32
33	4 47	4 11	3 45	3 24	3 7	2 54	2 42	2 27	2 14	2 5	1 59	1 54	1 50	1 48	1 46	1 45	33
34	4 54	4 16	3 50	3 28	3 11	2 57	2 45	2 29	2 16	2 7	2 0	1 55	1 51	1 48	1 47	1 46	34
35	5 1	4 22	3 55	3 33	3 15	3 1	2 49	2 32	2 19	2 9	2 2	1 56	1 52	1 49	1 47	1 46	35
36	5 8	4 28	4 0	3 37	3 19	3 5	2 52	2 34	2 21	2 10	2 3	1 58	1 53	1 49	1 47	1 45	36
37	5 15	4 34	4 5	3 42	3 23	3 8	2 56	2 37	2 23	2 12	2 4	1 59	1 54	1 50	1 48	1 47	37
38	5 21	4 40	4 10	3 46	3 27	3 12	2 59	2 39	2 25	2 14	2 6	2 0	1 55	1 51	1 49	1 47	38
39	5 28	4 45	4 15	3 51	3 31	3 15	3 2	2 42	2 29	2 16	2 7	2 1	1 56	1 52	1 49	1 47	39
40	5 34	4 51	4 20	3 55	3 35	3 19	3 5	2 44	2 29	2 18	2 9	2 3	1 57	1 52	1 49	1 47	40
41	5 41	4 56	4 25	3 59	3 39	3 23	3 8	2 47	2 31	2 20	2 11	2 4	1 58	1 53	1 50	1 48	41
42	5 47	5 1	4 30	4 3	3 43	3 26	3 11	2 49	2 33	2 21	2 12	2 5	1 59	1 54	1 51	1 49	42
43	5 53	5 7	4 35	4 7	3 47	3 30	3 14	2 52	2 35	2 23	2 13	2 7	2 0	1 55	1 52	1 50	43
44	6 0	5 12	4 40	4 11	3 50	3 34	3 17	2 54	2 37	2 25	2 15	2 8	2 1	1 56	1 53	1 51	44
46	6 12	5 22	4 49	4 19	3 57	3 40	3 23	2 59	2 41	2 29	2 18	2 10	2 3	1 58	1 55	1 52	46
48	6 24	5 32	4 58	4 27	4 4	3 46	3 29	3 4	2 45	2 32	2 21	2 12	2 5	2 0	1 56	1 53	48
50	6 35	5 42	5 6	4 35	4 11	3 52	3 35	3 9	2 49	2 35	2 24	2 15	2 8	2 2	1 58	1 55	50
52	6 45	5 51	5 14	4 42	4 17	3 58	3 40	3 13	2 53	2 38	2 27	2 18	2 10	2 4	2 0	1 57	52
54	6 55	6 0	5 22	4 49	4 23	4 4	3 45	3 17	2 57	2 41	2 30	2 20	2 12	2 6	2 2	1 58	54
56	7 5	6 9	5 29	4 55	4 29	4 9	3 50	3 21	3 1	2 44	2 32	2 22	2 14	2 8	2 3	1 59	56
58	7 14	6 17	5 36	5 1	4 34	4 14	3 55	3 25	3 4	2 47	2 35	2 24	2 16	2 9	2 4	2 0	58
60	7 22	6 25	5 42	5 6	4 39	4 19	3 59	3 29	3 7	2 50	2 37	2 26	2 17	2 10	2 5	2 1	60
62	7 30	6 32	5 48	5 11	4 44	4 23	4 3	3 33	3 10	2 53	2 39	2 28	2 19	2 12	2 7	2 2	62
64	7 38	6 39	5 54	5 16	4 49	4 27	4 5	3 36	3 13	2 56	2 41	2 29	2 20	2 13	2 8	2 3	64
66	7 45	6 45	6 0	5 21	4 54	4 31	4 11	3 39	3 16	2 58	2 43	2 31	2 22	2 15	2 9	2 3	66
68	7 51	6 50	6 5	5 25	4 58	4 35	4 15	3 41	3 19	3 0	2 45	2 33	2 24	2 16	2 10	2 4	68
70	7 57	6 54	6 9	5 29	5 2	4 39	4 18	3 44	3 21	3 2	2 46	2 34	2 25	2 17	2 10		70
72	8 2	6 58	6 13	5 33	5 6	4 42	4 21	3 46	3 23	3 3	2 47	2 35	2 26	2 18			72
74	8 6	7 2	6 17	5 36	5 9	4 44	4 23	3 48	3 24	3 4	2 48	2 36	2 27				74
76	8 10	7 5	6 20	5 38	5 11	4 46	4 25	3 50	3 25	3 5	2 49	2 37					76
78	8 14	7 8	6 23	5 42	5 13	4 48	4 26	3 51	3 26	3 6	2 50						78
80	8 18	7 11	6 26	5 45	5 15	4 50	4 27	3 52	3 27	3 7							80
82	8 21	7 14	6 28	5 47	5 17	4 51	4 28	3 53	3 28								82
84	8 24	7 17	6 30	5 49	5 18	4 52	4 29	3 54									84
86	8 26	7 19	6 31	5 50	5 19	4 53	4 30										86
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE XVIII.

Third Correction, to Apparent Distance 84°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	4 34	4 48	5 2	5 15	5 41	6 6	6 29	6 51	7 10	7 27	7 42	7 55	8 6	8 14	8 21	8 27	6
7	4 0	4 12	4 24	4 36	4 58	5 19	5 39	5 58	6 15	6 30	6 42	6 53	7 2	7 9	7 15	7 19	7
8	3 36	3 47	3 57	4 7	4 27	4 46	5 4	5 20	5 34	5 46	5 58	6 9	6 17	6 23	6 28	6 31	8
9	3 16	3 25	3 34	3 43	4 0	4 17	4 33	4 47	4 59	5 10	5 20	5 29	5 36	5 42	5 47	5 50	9
10	3 1	3 9	3 17	3 25	3 41	3 55	1 9	4 21	4 33	4 43	4 53	5 1	5 7	5 13	5 17	5 19	10
11	2 48	2 55	3 3	3 10	3 24	3 37	3 50	4 2	4 12	4 21	4 30	4 37	4 43	4 48	4 51	4 54	11
12	2 36	2 44	2 51	2 58	3 10	3 22	3 34	3 45	3 54	4 2	4 10	4 16	4 22	4 26	4 28	4 30	12
13	2 29	2 35	2 41	2 47	2 58	3 9	3 20	3 29	3 38	3 45	3 52	3 58	4 3	4 7	4 9		13
14	2 22	2 27	2 33	2 38	2 48	2 58	3 8	3 16	3 24	3 31	3 37	3 43	3 47	3 51	3 53		14
15	2 16	2 21	2 26	2 30	2 39	2 48	2 57	3 5	3 12	3 19	3 25	3 30	3 34	3 37	3 40		15
16	2 11	2 15	2 20	2 24	2 32	2 40	2 48	2 56	3 2	3 9	3 15	3 19	3 23	3 26	3 29		16
17	2 7	2 10	2 14	2 18	2 26	2 34	2 41	2 48	2 54	3 0	3 5	3 9	3 13	3 15			17
18	2 3	2 6	2 10	2 13	2 21	2 28	2 34	2 40	2 46	2 52	2 57	3 1	3 4	3 6			18
19	2 0	2 3	2 6	2 9	2 16	2 23	2 29	2 34	2 40	2 45	2 49	2 53	2 56	2 58			19
20	1 57	2 0	2 2	2 5	2 12	2 18	2 24	2 29	2 34	2 38	2 42	2 45	2 48	2 50			20
21	1 54	1 57	1 59	2 2	2 8	2 13	2 19	2 24	2 29	2 33	2 36	2 39	2 41				21
22	1 52	1 54	1 56	1 59	2 4	2 9	2 14	2 19	2 24	2 28	2 31	2 34	2 36				22
23	1 50	1 52	1 54	1 56	2 1	2 5	2 10	2 15	2 19	2 23	2 26	2 29	2 32				23
24	1 49	1 50	1 52	1 54	1 58	2 2	2 7	2 11	2 15	2 19	2 22	2 25	2 28				24
25	1 48	1 49	1 50	1 52	1 56	2 0	2 4	2 8	2 12	2 15	2 18	2 21					25
26	1 47	1 48	1 49	1 51	1 54	1 58	2 2	2 5	2 9	2 12	2 15	2 17					26
27	1 47	1 48	1 49	1 50	1 53	1 56	2 0	2 3	2 6	2 9	2 12	2 14					27
28	1 46	1 47	1 48	1 49	1 51	1 54	1 58	2 1	2 3	2 6	2 9	2 11					28
29	1 46	1 47	1 47	1 48	1 50	1 53	1 56	1 59	2 1	2 4	2 6						29
30	1 45	1 46	1 46	1 47	1 49	1 52	1 55	1 57	2 0	2 2	2 3						30
31	1 45	1 45	1 46	1 47	1 49	1 51	1 54	1 56	1 58	2 0	2 1						31
32	1 45	1 45	1 45	1 46	1 48	1 50	1 52	1 54	1 56	1 58	1 59						32
33	1 45	1 45	1 45	1 46	1 47	1 49	1 51	1 53	1 54	1 56							33
34	1 45	1 44	1 44	1 45	1 46	1 48	1 50	1 52	1 53	1 54							34
35	1 45	1 44	1 44	1 45	1 46	1 47	1 49	1 50	1 51	1 52							35
36	1 46	1 45	1 44	1 44	1 45	1 46	1 48	1 49	1 50	1 50							36
37	1 46	1 45	1 44	1 44	1 45	1 45	1 47	1 48	1 49								37
38	1 46	1 15	1 44	1 44	1 44	1 45	1 46	1 47	1 48								38
39	1 46	1 45	1 44	1 44	1 44	1 44	1 45	1 46	1 47								39
40	1 46	1 45	1 45	1 45	1 44	1 44	1 45	1 45	1 46								40
41	1 47	1 46	1 45	1 45	1 44	1 44	1 44	1 44									41
42	1 48	1 47	1 46	1 45	1 43	1 43	1 44	1 44									42
43	1 49	1 48	1 46	1 45	1 43	1 43	1 44	1 44									43
44	1 49	1 48	1 47	1 45	1 43	1 43	1 43										44
46	1 50	1 49	1 47	1 45	1 43	1 43	1 43										46
48	1 51	1 50	1 48	1 46	1 44	1 43	1 42										48
50	1 53	1 51	1 49	1 47	1 44	1 43											50
52	1 54	1 51	1 49	1 47	1 44	1 42											52
54	1 55	1 52	1 49	1 47	1 44												54
56	1 56	1 53	1 50	1 48	1 44												56
58	1 56	1 53	1 50	1 48													
60	1 57	1 54	1 51	1 48													
62	1 58	1 54	1 51														
64	1 59	1 55															
66	1 59																
68																	
70																	
72																	
74																	
76																	
78																	
80																	
82																	
84																	
86																	
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°						

TABLE P. EFFECT OF SUN's PAR.

To be subtracted from the third Correction.

☽'s App Alt.	Sun's Apparent Altitude.									
	5	10	20	30	40	50	60	70	80	90
	″	″	″	″	″	″	″	″	″	″
5	1	1	1	0	0	0	0	0	0	
10	1	1	1	1	1	1	1	1	1	0
15	2	2	2	2	2	2	2	2	1	
20	3	3	3	3	2	2	2	2		
25	4	4	3	3	3	3	3	3		
30	4	4	4	4	4	4	4	4		
35	5	5	5	5	5	4	4			
40	6	6	5	5	5	5	5			
45	6	6	6	6	6	6				
50	7	7	7	6	6					
55	7	7	7	7	7					
60	8	8	7	7						
65	8	8	8	8						
70	8	8	6							
75	9	9	8							
80	9	9								
90	9									

TABLE XVIII

THIRD CORRECTION, to APPARENT DISTANCE 88°.

☽'s App Alt	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	1 53	1 54	1 56	1 59	2 4	2 10	2 16	2 28	2 42	2 56	3 11	3 26	3 41	3 56	4 11	4 25	6
7	1 55	1 53	1 54	1 56	1 59	2 3	2 7	2 16	2 27	2 39	2 51	3 4	3 16	3 28	3 40	3 52	7
8	1 58	1 55	1 53	1 54	1 56	1 59	2 2	2 8	2 17	2 27	2 37	2 48	2 59	3 9	3 19	3 30	8
9	2 2	1 58	1 55	1 53	1 54	1 56	1 58	2 3	2 10	2 18	2 26	2 35	2 45	2 54	3 3	3 12	9
10	2 7	2 1	1 57	1 55	1 53	1 54	1 56	2 0	2 5	2 11	2 18	2 25	2 34	2 43	2 50	2 58	10
11	2 13	2 5	2 0	1 57	1 55	1 53	1 54	1 57	2 1	2 6	2 12	2 18	2 25	2 32	2 39	2 47	11
12	2 19	2 10	2 4	2 0	1 57	1 54	1 53	1 55	1 58	2 2	2 7	2 12	2 18	2 24	2 30	2 37	12
13	2 26	2 15	2 8	2 3	1 59	1 56	1 54	1 54	1 56	1 59	2 3	2 7	2 12	2 18	2 23	2 29	13
14	2 33	2 21	2 12	2 6	2 1	1 58	1 56	1 53	1 55	1 57	2 0	2 3	2 7	2 12	2 17	2 22	14
15	2 40	2 26	2 16	2 9	2 4	2 0	1 57	1 54	1 54	1 55	1 58	2 0	2 4	2 8	2 13	2 17	15
16	2 47	2 32	2 20	2 13	2 7	2 2	1 59	1 55	1 53	1 54	1 56	1 58	2 1	2 5	2 9	2 13	16
17	2 54	2 37	2 25	2 17	2 10	2 5	2 1	1 56	1 53	1 53	1 55	1 57	1 59	2 2	2 5	2 9	17
18	3 2	2 43	2 30	2 21	2 13	2 7	2 3	1 58	1 54	1 52	1 54	1 56	1 58	2 0	2 2	2 5	18
19	3 10	2 49	2 35	2 25	2 16	2 10	2 5	1 59	1 55	1 53	1 53	1 54	1 56	1 58	2 0	2 3	19
20	3 17	2 55	2 41	2 29	2 20	2 13	2 8	2 1	1 56	1 54	1 52	1 53	1 54	1 56	1 58	2 1	20
21	3 25	3 2	2 46	2 34	2 24	2 17	2 11	2 3	1 58	1 55	1 53	1 52	1 53	1 55	1 57	1 59	21
22	3 32	3 8	2 52	2 39	2 28	2 20	2 14	2 5	1 59	1 56	1 53	1 52	1 53	1 54	1 55	1 57	22
23	3 40	3 15	2 57	2 43	2 32	2 24	2 17	2 7	2 1	1 57	1 54	1 52	1 52	1 53	1 54	1 55	23
24	3 47	3 21	3 2	2 48	2 36	2 27	2 20	2 9	2 2	1 58	1 55	1 53	1 52	1 52	1 53	1 54	24
25	3 55	3 27	3 8	2 52	2 40	2 31	2 23	2 11	2 4	2 0	1 56	1 53	1 52	1 52	1 53	1 54	25
26	4 2	3 33	3 13	2 57	2 44	2 35	2 27	2 14	2 6	2 1	1 57	1 54	1 53	1 52	1 52	1 53	26
27	4 10	3 39	3 18	3 2	2 48	2 38	2 30	2 17	2 8	2 2	1 58	1 55	1 53	1 52	1 52	1 52	27
28	4 17	3 45	3 23	3 6	2 52	2 42	2 33	2 19	2 10	2 4	1 59	1 55	1 53	1 52	1 52	1 52	28
29	4 24	3 51	3 28	3 11	2 56	2 46	2 37	2 22	2 12	2 5	2 0	1 56	1 53	1 52	1 52	1 52	29
30	4 31	3 57	3 34	3 15	3 0	2 49	2 40	2 24	2 14	2 6	2 1	1 57	1 54	1 53	1 52	1 52	30
31	4 39	4 3	3 40	3 20	3 4	2 53	2 43	2 27	2 16	2 8	2 2	1 58	1 55	1 53	1 52	1 52	31
32	4 46	4 9	3 45	3 25	3 8	2 56	2 46	2 29	2 18	2 9	2 3	1 59	1 56	1 54	1 53	1 52	32
33	4 53	4 15	3 51	3 29	3 12	3 0	2 50	2 31	2 20	2 11	2 5	2 0	1 56	1 54	1 53	1 53	33
34	5 0	4 21	3 56	3 34	3 17	3 4	2 53	2 34	2 22	2 13	2 7	2 1	1 57	1 55	1 54	1 53	34
35	5 7	4 27	4 1	3 38	3 21	3 7	2 56	2 37	2 24	2 15	2 8	2 2	1 58	1 56	1 54	1 53	35
36	5 13	4 33	4 6	3 43	3 25	3 11	2 59	2 40	2 26	2 17	2 10	2 4	1 59	1 56	1 54	1 53	36
37	5 20	4 39	4 11	3 48	3 29	3 15	3 2	2 43	2 28	2 19	2 11	2 5	2 0	1 57	1 55	1 54	37
38	5 27	4 45	4 16	3 52	3 33	3 18	3 5	2 46	2 31	2 21	2 13	2 6	2 1	1 58	1 56	1 54	38
39	5 34	4 51	4 21	3 57	3 37	3 22	3 8	2 49	2 33	2 22	2 14	2 7	2 2	1 58	1 56	1 55	39
40	5 40	4 56	4 26	4 1	3 41	3 25	3 11	2 51	2 35	2 24	2 16	2 9	2 3	1 59	1 57	1 55	40
41	5 47	5 2	4 31	4 5	3 45	3 29	3 14	2 54	2 38	2 26	2 17	2 10	2 4	2 0	1 57	1 55	41
42	5 53	5 7	4 36	4 9	3 49	3 32	3 17	2 56	2 40	2 28	2 19	2 11	2 5	2 1	1 58	1 56	42
43	6 0	5 13	4 41	4 14	3 53	3 36	3 20	2 59	2 42	2 30	2 20	2 12	2 6	2 2	1 59	1 57	43
44	6 6	5 19	4 46	4 18	3 57	3 39	3 23	3 1	2 44	2 32	2 22	2 13	2 7	2 3	2 0	1 58	44
46	6 18	5 29	4 55	4 26	4 4	3 46	3 29	3 6	2 48	2 35	2 25	2 16	2 9	2 5	2 2	1 59	46
48	6 29	5 39	5 4	4 34	4 11	3 52	3 35	3 11	2 52	2 39	2 28	2 18	2 11	2 7	2 3	2 0	48
50	6 40	5 48	5 12	4 41	4 17	3 58	3 41	3 15	2 56	2 42	2 31	2 21	2 13	2 9	2 5	2 2	50
52	6 51	5 57	5 20	4 48	4 23	4 2	3 47	3 19	2 59	2 45	2 34	2 24	2 16	2 10	2 6	2 3	52
54	7 1	6 6	5 28	4 55	4 29	4 8	3 52	3 23	3 3	2 48	2 36	2 27	2 18	2 12	2 8	2 4	54
56	7 10	6 15	5 35	5 1	4 35	4 14	3 57	3 27	3 7	2 51	2 39	2 29	2 20	2 14	2 9	2 5	56
58	7 19	6 23	5 42	5 7	4 40	4 19	4 2	3 31	3 10	2 54	2 42	2 31	2 22	2 16	2 11	2 6	58
60	7 28	6 31	5 48	5 12	4 45	4 24	4 6	3 35	3 13	2 57	2 44	2 33	2 24	2 17	2 12	2 7	60
62	7 36	6 38	5 54	5 17	4 50	4 29	4 10	3 38	3 16	2 59	2 46	2 35	2 26	2 19	2 13	2 8	62
64	7 44	6 45	6 0	5 22	4 55	4 33	4 14	3 42	3 19	3 2	2 48	2 37	2 28	2 20	2 14	2 9	64
66	7 51	6 51	6 5	5 27	5 0	4 37	4 18	3 45	3 22	3 4	2 50	2 39	2 30	2 22	2 15		66
68	7 58	6 56	6 10	5 32	5 4	4 41	4 21	3 48	3 25	3 6	2 51	2 40	2 31	2 23			68
70	8 4	7 1	6 15	5 36	5 8	4 44	4 23	3 50	3 27	3 8	2 53	2 41	2 32				70
72	8 10	7 5	6 19	5 40	5 11	4 47	4 25	3 52	3 29	3 9	2 53	2 42					72
74	8 15	7 9	6 23	5 43	5 14	4 49	4 27	3 54	3 30	3 10	2 54						74
76	8 19	7 13	6 26	5 46	5 17	4 51	4 29	3 56	3 31	3 11							76
78	8 22	7 16	6 29	5 49	5 19	4 53	4 31	3 57	3 32								78
80	8 25	7 19	6 31	5 52	5 21	4 55	4 33	3 58									80
82	8 28	7 22	6 33	5 54	5 23	4 57	4 35										82
84	8 30	7 24	6 35	5 56	5 25												81
86	8 32	7 26	6 37														86
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE XVIII.

Third Correction, to Apparent Distance 88°

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	86°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	4 40	4 54	5 8	5 22	5 48	6 13	6 36	6 57	7 16	7 34	7 49	8 2	8 13	8 21	8 27	8 32	6
7	4 4	4 16	4 28	4 40	5 3	5 25	5 45	6 4	6 21	6 36	6 49	7 0	7 9	7 16	7 22	7 27	7
8	3 41	3 52	4 3	4 13	4 33	4 52	5 10	5 26	5 40	5 53	6 5	6 15	6 23	6 29	6 34	6 37	8
9	3 22	3 31	3 41	3 50	4 8	4 24	4 39	4 53	5 5	5 16	5 26	5 35	5 43	5 49	5 54		9
10	3 6	3 14	3 22	3 30	3 46	4 1	4 15	4 27	4 38	4 49	4 58	5 7	5 14	5 19	5 23		10
11	2 54	3 2	3 9	3 16	3 30	3 43	3 56	4 7	4 17	4 27	4 36	4 43	4 49	4 53	4 57		11
12	2 44	2 51	2 58	3 4	3 16	3 28	3 40	3 50	4 0	4 8	4 16	4 23	4 28	4 32	4 36		12
13	2 35	2 41	2 47	2 53	3 4	3 15	3 26	3 35	3 44	3 52	3 59	4 5	4 10	4 13			13
14	2 27	2 33	2 38	2 44	2 54	3 4	3 14	3 22	3 30	3 37	3 44	3 50	3 54	3 57			14
15	2 22	2 27	2 32	2 36	2 46	2 55	3 4	3 11	3 18	3 25	3 31	3 37	3 41	3 44			15
16	2 17	2 21	2 26	2 30	2 39	2 47	2 55	3 2	3 9	3 15	3 21	3 26	3 30	3 33			16
17	2 12	2 16	2 21	2 25	2 33	2 40	2 47	3 54	3 0	3 6	3 12	3 16	3 19				17
18	2 8	2 12	2 16	2 20	2 27	2 34	2 41	2 47	2 53	2 58	3 3	3 7	3 10				18
19	2 5	2 8	2 12	2 16	2 22	2 29	2 35	2 41	2 47	2 52	2 56	2 59	3 2				19
20	2 3	2 6	2 9	2 12	2 18	2 24	2 30	2 35	2 41	2 46	2 49	2 52	2 54				20
21	2 1	2 3	2 6	2 8	2 14	2 19	2 25	2 30	2 35	2 40	2 43	2 46					21
22	1 59	2 1	2 3	2 5	2 10	2 15	2 20	2 25	2 30	2 35	2 38	2 41					22
23	1 57	1 59	2 1	2 3	2 7	2 12	2 16	2 21	2 26	2 30	2 33	2 36					23
24	1 56	1 57	1 59	2 1	2 5	2 9	2 13	2 17	2 22	2 26	2 29	2 31					24
25	1 55	1 56	1 57	1 59	2 3	2 6	2 10	2 14	2 18	2 22	2 25						25
26	1 54	1 55	1 56	1 58	2 1	2 4	2 8	2 12	2 15	2 18	2 21						26
27	1 53	1 54	1 55	1 57	2 0	2 3	2 6	2 10	2 13	2 15	2 17						27
28	1 53	1 54	1 55	1 56	1 58	2 1	2 4	2 8	2 11	2 13	2 14						28
29	1 52	1 53	1 54	1 55	1 57	2 0	2 3	2 6	2 8	2 10							29
30	1 52	1 53	1 53	1 54	1 56	1 59	2 2	2 4	2 6	2 8							30
31	1 52	1 52	1 52	1 53	1 55	1 58	2 0	2 2	2 4	2 5							31
32	1 51	1 52	1 52	1 53	1 55	1 57	1 59	2 1	2 2	2 3							32
33	1 52	1 51	1 51	1 52	1 54	1 56	1 58	1 59	2 0								33
34	1 52	1 51	1 51	1 52	1 53	1 55	1 57	1 58	1 59								34
35	1 52	1 51	1 51	1 51	1 52	1 54	1 56	1 57	1 57								35
36	1 53	1 52	1 51	1 51	1 52	1 53	1 55	1 56	1 56								36
37	1 53	1 52	1 51	1 51	1 51	1 52	1 54	1 55									37
38	1 53	1 52	1 51	1 50	1 51	1 52	1 53	1 54									38
39	1 54	1 52	1 51	1 50	1 51	1 52	1 52	1 53									39
40	1 54	1 53	1 52	1 51	1 50	1 51	1 52	1 52									40
41	1 54	1 53	1 52	1 51	1 50	1 51	1 51										41
42	1 54	1 53	1 52	1 51	1 50	1 51	1 51										42
43	1 55	1 54	1 53	1 52	1 51	1 51	1 51										43
44	1 56	1 54	1 53	1 52	1 51	1 50	1 50										44
46	1 57	1 55	1 53	1 52	1 51	1 50											46
48	1 58	1 56	1 54	1 53	1 51	1 50											48
50	1 59	1 57	1 55	1 53	1 51												50
52	2 0	1 58	1 55	1 53	1 52												52
54	2 1	1 58	1 56	1 54													54
56	2 2	1 59	1 56	1 54													56
58	2 3	1 59	1 56														
60	2 3	1 59															
62	2 4																
64																	
66																	
68																	
70																	
72																	
74																	
76																	
78																	
80																	
82																	
84																	
86																	
	32°	34°	36°	38°	42°	46°	50°	54°	58°	62°	66°						

TABLE *P*. EFFECT OF SUN'S PAR.
To be subtracted from the third Correction.

☽'s App Alt.	Sun's Apparent Altitude.									
	5	10	20	30	40	50	60	70	80	90
	″	″	″	″	″	″	″	″	″	″
5	1	1	1	1	1	1	1	0	0	
10	2	1	1	1	1	1	1	1	1	0
15	2	2	2	2	2	2	2	2	2	
20	3	3	3	3	3	3	3	3		
25	4	4	4	4	4	4	4	4		
30	4	4	4	4	4	4	4			
35	5	5	5	5	5	5	5			
40	6	6	6	6	6					
45	6	6	6	6	6					
50	7	7	7	7	7					
55	7	7	7	7	7					
60	8	8	8	8						
65	8	8	8							
70	8	8	8							
75	9	9								
80	9	9								
90	9									

TABLE XVIII.

Third Correction, to Apparent Distance 92°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	1 59	2 1	2 3	2 6	2 10	2 15	2 21	2 34	2 48	3 3	3 18	3 33	3 48	4 3	4 18	4 33	6
7	2 1	1 59	2 1	2 3	2 5	2 9	2 13	2 22	2 33	2 45	2 58	3 11	3 24	3 36	3 48	4 0	7
8	2 4	2 1	1 59	2 0	2 2	2 4	2 7	2 14	2 23	2 33	2 44	2 55	3 5	3 16	3 26	3 37	8
9	2 8	2 4	2 1	1 59	2 0	2 2	2 4	2 9	2 16	2 24	2 33	2 42	2 51	3 1	3 10	3 19	9
10	2 13	2 7	2 3	2 1	1 59	2 0	2 2	2 6	2 11	2 17	2 24	2 32	2 40	2 48	2 57	3 5	10
11	2 19	2 11	2 6	2 3	2 1	1 59	2 0	2 3	2 7	2 12	2 18	2 24	2 31	2 39	2 46	2 54	11
12	2 25	2 16	2 10	2 6	2 3	2 1	1 59	2 1	2 4	2 8	2 13	2 18	2 24	2 31	2 37	2 44	12
13	2 32	2 21	2 14	2 9	2 5	2 2	2 0	2 0	2 2	2 5	2 9	2 14	2 19	2 24	2 30	2 36	13
14	2 39	2 27	2 18	2 12	2 7	2 4	2 2	1 59	2 1	2 3	2 6	2 10	2 14	2 19	2 24	2 29	14
15	2 46	2 32	2 22	2 15	2 10	2 6	2 3	2 0	2 0	2 1	2 4	2 7	2 10	2 15	2 19	2 24	15
16	2 53	2 38	2 27	2 19	2 13	2 8	2 5	2 1	1 59	2 0	2 2	2 4	2 7	2 11	2 15	2 19	16
17	3 0	2 44	2 32	2 23	2 16	2 11	2 7	2 3	2 0	1 59	2 1	2 3	2 5	2 8	2 12	2 15	17
18	3 8	2 50	2 37	2 27	2 19	2 14	2 9	2 4	2 1	1 59	2 0	2 2	2 4	2 6	2 9	2 12	18
19	3 16	2 56	2 42	2 31	2 22	2 16	2 11	2 6	2 2	2 0	2 0	2 1	2 2	2 4	2 7	2 10	19
20	3 23	3 2	2 48	2 36	2 26	2 19	2 14	2 8	2 3	2 0	1 59	2 0	2 1	2 3	2 5	2 8	20
21	3 31	3 9	2 54	2 41	2 30	2 23	2 17	2 10	2 5	2 1	1 59	1 59	2 0	2 2	2 4	2 6	21
22	3 38	3 15	2 59	2 45	2 34	2 26	2 20	2 12	2 6	2 2	2 0	1 59	2 0	2 1	2 2	2 4	22
23	3 46	3 22	3 4	2 50	2 38	2 30	2 23	2 14	2 8	2 3	2 0	1 59	1 59	2 0	2 1	2 2	23
24	3 53	3 28	3 9	2 54	2 42	2 34	2 27	2 16	2 9	2 4	2 1	2 0	1 59	1 59	2 0	2 1	24
25	4 1	3 34	3 15	2 59	2 46	2 37	2 30	2 19	2 11	2 5	2 2	2 0	1 59	1 59	2 0	2 0	25
26	4 9	3 40	3 20	3 3	2 50	2 41	2 33	2 22	2 13	2 7	2 4	2 1	1 59	1 59	1 59	2 0	26
27	4 17	3 46	3 26	3 8	2 55	2 45	2 36	2 24	2 15	2 9	2 5	2 2	2 0	1 59	1 59	2 0	27
28	4 24	3 52	3 31	3 13	2 59	2 48	2 39	2 27	2 17	2 11	2 6	2 2	2 0	1 59	1 59	1 59	28
29	4 31	3 58	3 36	3 18	3 3	2 52	2 43	2 29	2 19	2 12	2 7	2 3	2 1	2 0	1 59	1 59	29
30	4 38	4 4	3 41	3 22	3 7	2 56	2 46	2 32	2 21	2 13	2 8	2 4	2 1	2 0	1 59	1 59	30
31	4 46	4 10	3 47	3 27	3 12	3 0	2 50	2 35	2 23	2 15	2 9	2 5	2 2	2 0	1 59	1 59	31
32	4 53	4 16	3 52	3 32	3 16	3 4	2 53	2 37	2 25	2 16	2 11	2 7	2 3	2 1	2 0	1 59	32
33	5 0	4 22	3 58	3 37	3 20	3 8	2 57	2 40	2 27	2 18	2 12	2 8	2 4	2 1	2 0	1 59	33
34	5 7	4 28	4 3	3 41	3 24	3 11	3 0	2 42	2 29	2 20	2 14	2 9	2 5	2 2	2 1	2 0	34
35	5 14	4 34	4 8	3 46	3 28	3 15	3 3	2 45	2 31	2 22	2 15	2 10	2 6	2 3	2 1	2 0	35
36	5 21	4 40	4 13	3 50	3 32	3 18	3 6	2 47	2 33	2 24	2 17	2 11	2 7	2 4	2 2	2 1	36
37	5 28	4 46	4 18	3 55	3 36	3 22	3 9	2 50	2 36	2 25	2 18	2 12	2 8	2 5	2 3	2 1	37
38	5 34	4 52	4 23	4 0	3 40	3 25	3 12	2 53	2 38	2 27	2 20	2 14	2 9	2 6	2 4	2 2	38
39	5 41	4 58	4 28	4 4	3 44	3 29	3 15	2 55	2 40	2 29	2 21	2 15	2 10	2 7	2 4	2 2	39
40	5 47	5 3	4 33	4 8	3 48	3 32	3 18	2 58	2 42	2 31	2 22	2 16	2 11	2 7	2 5	2 3	40
41	5 54	5 9	4 38	4 12	3 52	3 35	3 21	3 0	2 45	2 33	2 21	2 17	2 12	2 8	2 5	2 3	41
42	6 0	5 14	4 43	4 16	3 55	3 39	3 24	3 2	2 47	2 34	2 25	2 18	2 13	2 9	2 6	2 4	42
43	6 7	5 20	4 48	4 21	3 59	3 42	3 27	3 5	2 49	2 36	2 27	2 20	2 14	2 10	2 7	2 4	43
44	6 13	5 25	4 53	4 25	4 3	3 46	3 30	3 8	2 51	2 38	2 28	2 21	2 15	2 11	2 8	2 5	44
45	6 19	5 31	4 58	4 29	4 7	3 49	3 33	3 11	2 53	2 40	2 30	2 22	2 16	2 12	2 8	2 5	45
46	6 25	5 36	5 2	4 33	4 10	3 52	3 36	3 13	2 55	2 42	2 31	2 24	2 18	2 13	2 9	2 6	46
47	6 31	5 41	5 7	4 37	4 13	3 55	3 39	3 16	2 57	2 44	2 33	2 25	2 19	2 14	2 10	2 7	47
48	6 37	5 46	5 11	4 41	4 17	3 59	3 42	3 18	2 59	2 46	2 35	2 27	2 20	2 15	2 11	2 8	48
50	6 47	5 56	5 19	4 48	4 24	4 5	3 48	3 22	3 4	2 49	2 37	2 29	2 22	2 16	2 12	2 9	50
52	6 57	6 5	5 27	4 55	4 30	4 11	3 53	3 26	3 8	2 53	2 41	2 32	2 24	2 18	2 13	2 10	52
54	7 7	6 14	5 35	5 2	4 36	4 16	3 58	3 30	3 11	2 56	2 44	2 34	2 26	2 20	2 15	2 11	54
56	7 17	6 23	5 42	5 9	4 42	4 21	4 3	3 34	3 14	2 59	2 47	2 37	2 29	2 22	2 16	2 12	56
58	7 27	6 31	5 49	5 15	4 47	4 26	4 8	3 38	3 17	3 2	2 49	2 39	2 31	2 24	2 18	2 13	58
60	7 36	6 39	5 56	5 21	4 53	4 31	4 13	3 42	3 20	3 5	2 52	2 41	2 32	2 25	2 20	2 14	60
62	7 45	6 46	6 2	5 26	4 58	4 36	4 17	3 46	3 23	3 8	2 54	2 43	2 34	2 26	2 21		62
64	7 53	6 53	6 8	5 31	5 3	4 41	4 21	3 50	3 26	3 10	2 56	2 44	2 35	2 27			64
66	8 1	6 59	6 13	5 36	5 8	4 45	4 25	3 53	3 29	3 12	2 57	2 45	2 37				66
68	8 8	7 5	6 18	5 41	5 12	4 49	4 28	3 56	3 32	3 14	2 58	2 46					68
70	8 14	7 10	6 23	5 45	5 16	4 52	4 31	3 58	3 34	3 15	2 59						70
72	8 20	7 15	6 28	5 49	5 19	4 55	4 33	4 0	3 35	3 16							72
74	8 25	7 19	6 31	5 53	5 22	4 57	4 35	4 1	3 36								74
76	8 29	7 23	6 34	5 56	5 25	4 59	4 37	4 2									76
78	8 32	7 26	6 37	5 58	5 27	5 1	4 39										78
80	8 34	7 28	6 39	6 0	5 29												80
82	8 36	7 30	6 41														82
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 92°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	32°	34°	36°	38°	40°	42°	46°	50°	54°	58°	62°	66°	70°	74°	78°	82°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	4 47	5 2	5 16	5 30	5 44	5 57	6 21	6 44	7 5	7 24	7 42	7 59	8 12	8 22	8 30	8 36	6
7	4 12	4 24	4 36	4 48	5 0	5 11	5 33	5 53	6 12	6 29	6 44	6 58	7 10	7 18	7 25	7 30	7
8	3 48	3 59	4 10	4 20	4 30	4 40	4 59	5 17	5 33	5 48	6 1	6 13	6 23	6 31	6 37	6 41	8
9	3 29	3 38	3 48	3 57	4 6	4 14	4 30	4 45	5 0	5 13	5 25	5 35	5 44	5 52	5 58		9
10	3 13	3 21	3 30	3 38	3 45	3 52	4 8	4 22	4 34	4 46	4 57	5 7	5 15	5 22	5 27		10
11	3 1	3 8	3 16	3 22	3 29	3 36	3 50	4 3	4 14	4 24	4 34	4 43	4 51	4 57	5 2		11
12	2 51	2 57	3 4	3 10	3 17	3 23	3 35	3 47	3 57	4 6	4 15	4 23	4 30	4 36	4 41		12
13	2 42	2 47	2 53	2 59	3 6	3 12	3 23	3 33	3 42	3 51	4 0	4 7	4 13	4 17			13
14	2 34	2 39	2 44	2 50	2 56	3 2	3 12	3 21	3 30	3 38	3 46	3 52	3 57	4 1			14
15	2 28	2 33	2 38	2 43	2 48	2 53	3 2	3 11	3 19	3 26	3 33	3 39	3 44	3 49			15
16	2 23	2 28	2 32	2 37	2 42	2 46	2 54	3 2	3 9	3 16	3 22	3 28	3 33	3 38			16
17	2 19	2 23	2 27	2 32	2 36	2 40	2 47	2 54	3 1	3 7	3 13	3 19	3 24				17
18	2 16	2 19	2 23	2 27	2 31	2 34	2 41	2 48	2 54	3 0	3 6	3 11	3 15				18
19	2 13	2 16	2 19	2 23	2 26	2 29	2 36	2 42	2 48	2 54	2 59	3 4	3 7				19
20	2 10	2 13	2 16	2 19	2 22	2 25	2 31	2 37	2 43	2 48	2 53	2 57	3 0				20
21	2 8	2 10	2 13	2 16	2 18	2 21	2 26	2 32	2 38	2 43	2 47	2 51					21
22	2 6	2 8	2 10	2 13	2 15	2 17	2 22	2 28	2 33	2 38	2 42	2 45					22
23	2 4	2 6	2 8	2 10	2 12	2 14	2 19	2 24	2 29	2 34	2 38	2 41					23
24	2 2	2 4	2 6	2 8	2 10	2 12	2 16	2 21	2 26	2 30	2 34	2 38					24
25	2 1	2 3	2 4	2 6	2 8	2 10	2 14	2 18	2 22	2 26	2 30						25
26	2 1	2 2	2 3	2 5	2 6	2 8	2 12	2 15	2 19	2 23	2 26						26
27	2 0	2 1	2 2	2 4	2 5	2 7	2 10	2 13	2 16	2 20	2 23						27
28	1 59	2 0	2 1	2 3	2 4	2 6	2 8	2 11	2 14	2 17	2 20						28
29	1 59	1 59	2 0	2 2	2 3	2 5	2 7	2 10	2 12	2 15							29
30	1 59	1 59	2 0	2 1	2 2	2 4	2 6	2 9	2 11	2 13							30
31	1 59	1 59	1 59	2 0	2 1	2 3	2 5	2 7	2 9	2 11							31
32	1 59	1 59	1 59	2 0	2 1	2 2	2 4	2 6	2 7	2 9							32
33	1 59	1 59	1 59	1 59	2 0	2 1	2 3	2 5	2 6								33
34	1 59	1 58	1 59	1 59	2 0	2 1	2 2	2 4	2 5								34
35	1 59	1 58	1 59	1 59	2 0	2 0	2 1	2 3	2 4								35
36	2 0	1 59	1 59	1 59	2 0	2 0	2 1	2 2	2 3								36
37	2 0	1 59	1 59	1 58	1 59	1 59	2 0	2 1									37
38	2 0	1 59	1 59	1 58	1 59	1 59	2 0	2 1									38
39	2 1	2 0	1 59	1 58	1 58	1 59	1 59	2 0									39
40	2 1	2 0	1 59	1 58	1 58	1 58	1 59	2 0									40
41	2 1	2 0	1 59	1 59	1 58	1 58	1 58										41
42	2 2	2 0	1 59	1 59	1 58	1 58	1 58										42
43	2 2	2 1	2 0	1 59	1 58	1 58	1 58										43
44	2 3	2 1	2 0	1 59	1 58	1 58	1 57										44
45	2 3	2 2	2 1	2 0	1 59	1 58											45
46	2 4	2 2	2 1	2 0	1 59	1 58											46
47	2 4	2 2	2 1	2 0	1 59	1 58											47
48	2 5	2 3	2 2	2 1	1 59	1 59											48
50	2 6	2 4	2 2	2 1	2 0												50
52	2 7	2 5	2 3	2 1													52
54	2 8	2 5	2 3														
56	2 9	2 5															
58	2 10																
60																	
62																	
64																	
66																	
68																	
70																	
72																	
74																	
76																	
78																	
80																	
82																	
	32°	34°	36°	38°	40°	42°	46°	50°	54°	58°	62°						

TABLE P. EFFECT OF SUN's PAR.

To be subtracted from the third Correction.

☽'s App. Alt.	Sun's Apparent Altitude.									
	5	10	20	30	40	50	60	70	80	90
	″	″	″	″	″	″	″	″	″	″
5	1	1	1	1	1	1	1	1	1	
10	2	2	2	2	2	2	2	2	2	0
15	2	2	2	2	3	3	3	3		
20	3	3	3	3	3	3	3	3		
25	4	4	4	4	4	4	4			
30	4	4	5	5	5	5	5			
35	5	5	5	5	5	5				
40	6	6	6	6	6	6				
45	6	6	6	7	7					
50	7	7	7	7	7					
55	7	7	7	8						
60	8	8	8	8						
65	8	8	8							
70	9	8	8							
75	9	9								
80	9	9								
90										

TABLE XVIII.

THIRD CORRECTION to APPARENT DISTANCE 96°

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	2 6	2 8	2 10	2 13	2 17	2 22	2 28	2 41	2 55	3 10	3 26	3 41	3 56	4 11	4 26	4 41	6
7	2 9	2 6	2 8	2 10	2 12	2 16	2 20	2 29	2 40	2 52	3 5	3 18	3 31	3 43	3 56	4 8	7
8	2 12	2 8	2 6	2 7	2 9	2 12	2 15	2 22	2 31	2 40	2 51	3 2	3 13	3 24	3 35	3 45	8
9	2 16	2 11	2 8	2 6	2 7	2 9	2 12	2 17	2 24	2 31	2 40	2 49	2 59	3 8	3 18	3 27	9
10	2 20	2 14	2 10	2 8	2 6	2 7	2 9	2 13	2 18	2 24	2 32	2 40	2 48	2 56	3 4	3 12	10
11	2 26	2 18	2 13	2 10	2 7	2 6	2 7	2 10	2 14	2 19	2 25	2 32	2 39	2 46	2 53	3 1	11
12	2 32	2 23	2 17	2 13	2 9	2 7	2 6	2 8	2 11	2 15	2 20	2 26	2 32	2 38	2 45	2 52	12
13	2 39	2 28	2 21	2 16	2 12	2 9	2 7	2 7	2 9	2 12	2 16	2 21	2 26	2 32	2 38	2 44	13
14	2 46	2 33	2 25	2 19	2 14	2 11	2 9	2 6	2 8	2 10	2 13	2 18	2 22	2 27	2 32	2 37	14
15	2 53	2 39	2 29	2 22	2 17	2 14	2 11	2 7	2 7	2 9	2 11	2 15	2 19	2 23	2 28	2 32	15
16	3 1	2 45	2 34	2 26	2 20	2 16	2 13	2 8	2 5	2 8	2 10	2 13	2 16	2 20	2 24	2 28	16
17	3 8	2 51	2 39	2 30	2 23	2 19	2 15	2 9	2 7	2 7	2 9	2 11	2 14	2 17	2 21	2 24	17
18	3 15	2 57	2 44	2 34	2 26	2 21	2 17	2 11	2 8	2 6	2 8	2 10	2 12	2 15	2 18	2 21	18
19	3 23	3 3	2 49	2 38	2 30	2 24	2 19	2 13	2 9	2 7	2 7	2 8	2 10	2 13	2 15	2 18	19
20	3 30	3 9	2 54	2 43	2 34	2 27	2 22	2 15	2 11	2 8	2 6	2 7	2 9	2 11	2 13	2 15	20
21	3 38	3 16	3 0	2 48	2 37	2 30	2 25	2 17	2 12	2 9	2 7	2 7	2 8	2 9	2 11	2 13	21
22	3 46	3 22	3 5	2 52	2 41	2 33	2 28	2 19	2 14	2 10	2 8	2 6	2 7	2 8	2 10	2 12	22
23	3 54	3 28	3 11	2 57	2 45	2 37	2 31	2 21	2 15	2 11	2 8	2 6	2 6	2 7	2 9	2 11	23
24	4 1	3 34	3 16	3 1	2 49	2 41	2 35	2 23	2 17	2 12	2 9	2 7	2 6	2 7	2 8	2 10	24
25	4 9	3 41	3 22	3 6	2 53	2 45	2 38	2 26	2 19	2 14	2 11	2 8	2 6	2 7	2 8	2 9	25
26	4 16	3 47	3 27	3 11	2 57	2 48	2 41	2 29	2 21	2 16	2 12	2 9	2 7	2 6	2 7	2 8	26
27	4 24	3 53	3 33	3 15	3 1	2 52	2 44	2 31	2 23	2 17	2 13	2 10	2 8	2 6	2 6	2 7	27
28	4 31	4 0	3 38	3 20	3 6	2 55	2 47	2 34	2 24	2 18	2 14	2 11	2 9	2 7	2 6	2 7	28
29	4 39	4 6	3 44	3 25	3 10	2 59	2 50	2 36	2 26	2 20	2 15	2 12	2 10	2 8	2 7	2 6	29
30	4 46	4 12	3 49	3 29	3 14	3 3	2 53	2 38	2 28	2 21	2 16	2 13	2 10	2 8	2 7	2 6	30
31	4 53	4 18	3 55	3 34	3 18	3 7	2 57	2 41	2 30	2 23	2 18	2 14	2 11	2 9	2 8	2 7	31
32	5 0	4 24	4 0	3 39	3 23	3 11	3 1	2 44	2 32	2 25	2 19	2 15	2 12	2 9	2 8	2 7	32
33	5 7	4 30	4 5	3 44	3 27	3 15	3 4	2 46	2 34	2 26	2 20	2 16	2 13	2 10	2 8	2 7	33
34	5 14	4 36	4 11	3 49	3 32	3 19	3 7	2 48	2 36	2 28	2 21	2 17	2 14	2 11	2 9	2 8	34
35	5 21	4 42	4 16	3 54	3 36	3 23	3 11	2 51	2 38	2 30	2 23	2 18	2 15	2 12	2 10	2 8	35
36	5 28	4 48	4 21	3 59	3 40	3 26	3 14	2 54	2 40	2 32	2 25	2 20	2 16	2 13	2 11	2 9	36
37	5 35	4 54	4 26	4 3	3 44	3 29	3 17	2 57	2 43	2 33	2 26	2 21	2 17	2 14	2 11	2 9	37
38	5 42	5 0	4 31	4 8	3 48	3 33	3 20	2 59	2 45	2 35	2 27	2 22	2 18	2 15	2 12	2 10	38
39	5 49	5 6	4 36	4 12	3 52	3 36	3 23	3 2	2 47	2 37	2 29	2 23	2 19	2 16	2 13	2 11	39
40	5 55	5 12	4 41	4 16	3 56	3 40	3 26	3 5	2 50	2 39	2 30	2 24	2 20	2 16	2 13	2 11	40
41	6 2	5 18	4 46	4 20	4 0	3 44	3 30	3 7	2 52	2 41	2 32	2 25	2 21	2 17	2 14	2 12	41
42	6 8	5 23	4 51	4 24	4 4	3 47	3 33	3 10	2 54	2 43	2 34	2 27	2 22	2 18	2 15	2 13	42
43	6 14	5 29	4 56	4 29	4 8	3 51	3 36	3 13	2 57	2 45	2 35	2 28	2 23	2 19	2 16	2 13	43
44	6 20	5 34	5 1	4 33	4 11	3 54	3 39	3 16	2 59	2 47	2 37	2 29	2 24	2 20	2 17	2 14	44
45	6 26	5 39	5 6	4 37	4 14	3 57	3 42	3 19	3 1	2 48	2 38	2 30	2 25	2 21	2 17	2 14	45
46	6 32	5 44	5 10	4 41	4 18	4 0	3 45	3 21	3 3	2 50	2 39	2 31	2 26	2 22	2 18	2 15	46
47	6 38	5 49	5 15	4 45	4 22	4 3	3 48	3 24	3 5	2 52	2 41	2 33	2 27	2 23	2 19	2 16	47
48	6 44	5 54	5 19	4 49	4 25	4 7	3 51	3 26	3 7	2 53	2 42	2 34	2 28	2 24	2 20	2 16	48
49	6 50	5 59	5 23	4 53	4 29	4 10	3 54	3 28	3 9	2 55	2 44	2 36	2 29	2 25	2 21	2 17	49
50	6 55	6 4	5 27	4 57	4 32	4 13	3 57	3 30	3 11	2 56	2 45	2 37	2 31	2 26	2 21	2 17	50
51	7 0	6 9	5 31	5 1	4 36	4 16	4 0	3 32	3 13	2 58	2 47	2 38	2 32	2 27	2 22	2 18	51
52	7 5	6 14	5 35	5 4	4 39	4 19	4 3	3 34	3 15	3 0	2 48	2 39	2 33	2 28	2 23	2 18	52
54	7 15	6 23	5 43	5 11	4 45	4 25	4 8	3 38	3 19	3 2	2 51	2 42	2 35	2 29	2 24	2 19	54
56	7 25	6 31	5 51	5 18	4 51	4 30	4 13	3 42	3 22	3 6	2 54	2 45	2 37	2 30	2 25	2 19	56
58	7 35	6 39	5 58	5 24	4 56	4 35	4 17	3 46	3 26	3 9	2 57	2 47	2 39	2 31	2 25		58
60	7 45	6 46	6 4	5 30	5 1	4 39	4 21	3 50	3 29	3 12	2 59	2 49	2 41	2 32			60
62	7 54	6 53	6 10	5 35	5 6	4 44	4 25	3 54	3 32	3 15	3 1	2 50	2 42				62
64	8 2	7 0	6 16	5 40	5 11	4 48	4 29	3 58	3 35	3 17	3 3	2 51					64
66	8 10	7 7	6 21	5 45	5 16	4 52	4 33	4 1	3 38	3 19	3 4						66
68	8 17	7 13	6 26	5 50	5 21	4 56	4 36	4 3	3 40	3 21							68
70	8 24	7 18	6 31	5 54	5 25	5 0	4 39	4 5	3 42								70
72	8 29	7 23	6 36	5 58	5 28	5 3	4 41	4 7									72
74	8 33	7 27	6 40	6 1	5 31	5 6	4 43										74
76	8 37	7 31	6 43	6 4	5 34												76
78	8 40	7 34	6 46														78
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE XVIII.

THIRD CORRECTION to APPARENT DISTANCE 96°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	32°	34°	36°	38°	40°	42°	44°	46°	50°	54°	58°	62°	66°	70°	74°	78°	
°	′ ″	′ ′	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	4 56	5 10	5 21	5 38	5 51	6 4	6 17	6 29	6 52	7 14	7 34	7 52	8 9	8 23	8 33	8 40	6
7	4 20	4 32	4 44	4 56	5 8	5 20	5 31	5 42	6 2	6 20	6 37	6 52	7 6	7 18	7 28	7 35	7
8	3 56	4 7	4 18	4 29	4 39	4 49	4 59	5 8	5 26	5 42	5 56	6 9	6 21	6 31	6 40	6 47	8
9	3 37	3 46	3 55	4 4	4 13	4 23	4 32	4 40	4 56	5 10	5 23	5 34	5 44	5 53	6 1		9
10	3 22	3 30	3 37	3 45	3 53	4 2	4 10	4 17	4 31	4 43	4 55	5 6	5 16	5 24	5 31		10
11	3 9	3 17	3 24	3 31	3 38	3 45	3 52	3 59	4 11	4 22	4 33	4 43	4 52	5 0	5 7		11
12	2 59	3 6	3 12	3 19	3 25	3 32	3 38	3 45	3 55	4 5	4 15	4 24	4 32	4 39	4 46		12
13	2 50	2 56	3 2	3 8	3 14	3 20	3 26	3 32	3 42	3 51	4 0	4 8	4 15	4 21			13
14	2 42	2 48	2 53	2 58	3 4	3 9	3 15	3 20	3 30	3 39	3 48	3 55	4 1	4 6			14
15	2 36	2 41	2 46	2 50	2 55	3 0	3 5	3 10	3 19	3 28	3 36	3 43	3 49	3 54			15
16	2 32	2 36	2 40	2 44	2 48	2 53	2 57	3 2	3 10	3 18	3 25	3 32	3 38	3 44			16
17	2 28	2 31	2 35	2 39	2 43	2 47	2 51	2 55	3 3	3 10	3 16	3 22	3 28				17
18	2 24	2 27	2 31	2 35	2 38	2 42	2 45	2 49	2 56	3 2	3 8	3 14	3 19				18
19	2 21	2 24	2 27	2 31	2 34	2 37	2 40	2 44	2 50	2 56	3 2	3 7	3 11				19
20	2 18	2 21	2 24	2 27	2 30	2 33	2 36	2 39	2 45	2 51	2 56	3 1	3 4				20
21	2 16	2 19	2 21	2 24	2 26	2 29	2 32	2 35	2 41	2 46	2 51	2 55					21
22	2 14	2 17	2 19	2 21	2 23	2 26	2 28	2 31	2 37	2 42	2 46	2 50					22
23	2 13	2 15	2 17	2 19	2 21	2 23	2 25	2 28	2 33	2 38	2 42	2 45					23
24	2 11	2 13	2 15	2 17	2 19	2 21	2 23	2 25	2 30	2 35	2 38	2 41					24
25	2 10	2 11	2 13	2 15	2 17	2 19	2 21	2 23	2 27	2 31	2 35						25
26	2 9	2 10	2 12	2 13	2 15	2 17	2 19	2 21	2 25	2 28	2 31						26
27	2 8	2 9	2 11	2 12	2 14	2 16	2 18	2 20	2 23	2 25	2 27						27
28	2 8	2 9	2 10	2 11	2 13	2 15	2 17	2 18	2 21	2 23	2 24						28
29	2 7	2 8	2 9	2 10	2 12	2 13	2 15	2 17	2 19	2 21							29
30	2 7	2 8	2 9	2 10	2 11	2 12	2 14	2 15	2 17	2 19							30
31	2 6	2 7	2 8	2 9	2 10	2 11	2 12	2 14	2 16	2 17							31
32	2 6	2 7	2 7	2 8	2 9	2 10	2 11	2 12	2 14	2 16							32
33	2 6	2 6	2 7	2 7	2 8	2 9	2 10	2 11	2 13								33
34	2 7	2 6	2 7	2 7	2 8	2 9	2 10	2 11	2 12								34
35	2 7	2 6	2 6	2 7	2 7	2 8	2 9	2 10	2 11								35
36	2 8	2 7	2 6	2 6	2 7	2 8	2 9	2 9	2 10								36
37	2 8	2 7	2 6	2 6	2 7	2 7	2 8	2 8									37
38	2 9	2 8	2 7	2 6	2 6	2 7	2 8	2 8									38
39	2 9	2 8	2 7	2 6	2 6	2 7	2 7	2 8									39
40	2 10	2 8	2 7	2 6	2 6	2 6	2 7	2 7									40
41	2 10	2 9	2 8	2 7	2 7	2 6	2 6										41
42	2 11	2 9	2 8	2 7	2 7	2 6	2 6										42
43	2 11	2 10	2 8	2 7	2 7	2 6											43
44	2 12	2 10	2 8	2 7	2 7	2 6											44
45	2 12	2 10	2 9	2 8	2 7												45
46	2 13	2 11	2 9	2 8	2 7												46
47	2 13	2 11	2 9	2 8													47
48	2 13	2 11	2 9	2 8													48
49	2 14	2 12	2 10														49
50	2 14	2 12	2 10														50
51	2 14	2 12															
52	2 15	2 12															
54	2 15																
56																	
58																	
60																	
62																	
64																	
66																	
68																	
70																	
72																	
74																	
76																	
78																	
	32°	34°	36°	38°	40°	42°	44°	46°	50°	54°	58°						

TABLE *P*. EFFECT OF SUN's PAR.

To be subtracted from the third Correction.

☽'s App Alt.	Sun's Apparent Altitude.									
	5	10	20	30	40	50	60	70	80	90
	″	″	″	″	″	″	″	″	″	″
5	1	1	1	1	1	1	1	2	2	0
10	2	2	2	2	2	2	2	3		
15	2	2	3	3	3	3	3	3		
20	3	3	3	4	4	4	4			
25	4	4	4	4	4	5	5			
30	5	5	5	5	5	5				
35	5	5	5	6	6	6				
40	6	6	6	6	6					
45	6	7	7	7	7					
50	7	7	7	7						
55	7	8	8	8						
60	8	8	6							
65	8	6	8							
70	9	9								
75	9	9								
80	9									
90										

TABLE XVIII.

Third Correction, to Apparent Distance 100°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	2 13	2 15	2 18	2 21	2 25	2 31	2 37	2 49	3 3	3 18	3 33	3 48	4 4	4 19	4 34	4 49	6
7	2 16	2 13	2 15	2 17	2 20	2 24	2 29	2 38	2 49	3 1	3 13	3 25	3 38	3 50	4 3	4 16	7
8	2 19	2 15	2 13	2 14	2 16	2 19	2 23	2 31	2 39	2 49	2 59	3 10	3 21	3 32	3 43	3 54	8
9	2 23	2 18	2 15	2 13	2 14	2 16	2 19	2 25	2 32	2 40	2 48	2 58	3 7	3 16	3 26	3 35	9
10	2 28	2 22	2 18	2 15	2 13	2 14	2 16	2 21	2 26	2 33	2 40	2 48	2 56	3 4	3 13	3 21	10
11	2 33	2 26	2 21	2 17	2 15	2 13	2 14	2 18	2 22	2 27	2 33	2 40	2 47	2 54	3 2	3 10	11
12	2 40	2 30	2 24	2 20	2 17	2 14	2 13	2 16	2 19	2 23	2 28	2 34	2 40	2 46	2 53	3 0	12
13	2 47	2 35	2 28	2 23	2 19	2 16	2 14	2 14	2 17	2 20	2 24	2 29	2 34	2 40	2 45	2 51	13
14	2 54	2 40	2 32	2 26	2 21	2 18	2 16	2 13	2 15	2 18	2 21	2 25	2 30	2 35	2 39	2 44	14
15	3 1	2 46	2 36	2 29	2 24	2 21	2 18	2 14	2 14	2 16	2 19	2 22	2 26	2 30	2 34	2 39	15
16	3 8	2 52	2 41	2 33	2 27	2 23	2 20	2 16	2 13	2 15	2 17	2 20	2 23	2 26	2 30	2 35	16
17	3 15	2 58	2 46	2 37	2 30	2 25	2 22	2 17	2 14	2 14	2 16	2 18	2 21	2 24	2 27	2 31	17
18	3 23	3 4	2 51	2 41	2 33	2 28	2 24	2 19	2 15	2 13	2 15	2 17	2 19	2 22	2 25	2 28	18
19	3 30	3 11	2 56	2 45	2 37	2 31	2 26	2 20	2 16	2 14	2 14	2 16	2 17	2 20	2 22	2 25	19
20	3 38	3 17	3 2	2 50	2 41	2 34	2 29	2 22	2 18	2 15	2 13	2 15	2 16	2 18	2 20	2 23	20
21	3 45	3 24	3 8	2 54	2 45	2 38	2 32	2 24	2 19	2 16	2 14	2 14	2 15	2 17	2 19	2 21	21
22	3 53	3 30	3 13	2 59	2 49	2 41	2 35	2 26	2 21	2 18	2 15	2 13	2 14	2 16	2 18	2 20	22
23	4 1	3 36	3 19	3 4	2 53	2 45	2 38	2 28	2 23	2 19	2 16	2 13	2 13	2 15	2 17	2 19	23
24	4 9	3 42	3 24	3 9	2 58	2 49	2 42	2 31	2 24	2 20	2 17	2 14	2 13	2 14	2 16	2 18	24
25	4 16	3 49	3 30	3 14	3 2	2 53	2 45	2 33	2 26	2 21	2 18	2 15	2 14	2 14	2 15	2 17	25
26	4 24	3 55	3 35	3 19	3 6	2 56	2 48	2 36	2 28	2 23	2 19	2 16	2 14	2 14	2 15	2 16	26
27	4 31	4 2	3 41	3 24	3 11	3 0	2 51	2 38	2 30	2 24	2 20	2 17	2 15	2 14	2 14	2 15	27
28	4 39	4 8	3 46	3 28	3 15	3 4	2 54	2 40	2 32	2 25	2 21	2 18	2 16	2 15	2 14	2 15	28
29	4 46	4 14	3 52	3 33	3 19	3 7	2 58	2 43	2 34	2 26	2 22	2 19	2 17	2 15	2 14	2 14	29
30	4 54	4 20	3 57	3 38	3 23	3 11	3 1	2 45	2 36	2 28	2 24	2 21	2 18	2 16	2 15	2 14	30
31	5 1	4 26	4 3	3 42	3 27	3 15	3 5	2 48	2 38	2 30	2 25	2 22	2 19	2 17	2 15	2 14	31
32	5 8	4 33	4 8	3 47	3 31	3 18	3 8	2 51	2 40	2 32	2 27	2 23	2 20	2 17	2 16	2 15	32
33	5 16	4 39	4 14	3 52	3 36	3 22	3 11	2 54	2 42	2 33	2 28	2 24	2 21	2 18	2 16	2 15	33
34	5 23	4 45	4 19	3 57	3 40	3 26	3 15	2 56	2 44	2 35	2 29	2 25	2 22	2 19	2 17	2 16	34
35	5 30	4 51	4 24	4 2	3 44	3 30	3 18	2 59	2 46	2 37	2 31	2 26	2 23	2 20	2 18	2 16	35
36	5 37	4 57	4 29	4 7	3 48	3 34	3 22	3 2	2 49	2 39	2 32	2 28	2 24	2 20	2 18	2 17	36
37	5 44	5 3	4 35	4 12	3 52	3 38	3 25	3 5	2 51	2 41	2 34	2 29	2 25	2 21	2 19	2 18	37
38	5 51	5 9	4 40	4 16	3 56	3 41	3 28	3 8	2 54	2 43	2 36	2 30	2 26	2 22	2 20	2 18	38
39	5 58	5 15	4 45	4 21	4 0	3 45	3 31	3 11	2 56	2 45	2 37	2 31	2 27	2 23	2 21	2 19	39
40	6 4	5 21	4 50	4 25	4 4	3 48	3 34	3 14	2 58	2 47	2 38	2 32	2 28	2 24	2 22	2 20	40
41	6 11	5 27	4 55	4 29	4 8	3 52	3 38	3 17	3 1	2 49	2 40	2 34	2 29	2 25	2 22	2 20	41
42	6 18	5 33	5 0	4 33	4 12	3 55	3 41	3 19	3 3	2 51	2 41	2 35	2 30	2 26	2 23	2 21	42
43	6 24	5 38	5 5	4 38	4 16	3 59	3 44	3 22	3 6	2 53	2 43	2 36	2 31	2 27	2 24	2 22	43
44	6 30	5 44	5 9	4 42	4 20	4 2	3 47	3 24	3 8	2 55	2 45	2 38	2 32	2 28	2 25	2 22	44
45	6 36	5 49	5 14	4 46	4 24	4 6	3 50	3 27	3 10	2 57	2 47	2 39	2 33	2 29	2 26	2 23	45
46	6 42	5 54	5 18	4 50	4 27	4 9	3 53	3 29	3 12	2 59	2 48	2 41	2 35	2 30	2 27	2 24	46
47	6 48	5 59	5 23	4 54	4 31	4 12	3 56	3 32	3 14	3 0	2 50	2 42	2 36	2 31	2 28	2 25	47
48	6 54	6 4	5 27	4 58	4 34	4 15	3 59	3 34	3 16	3 2	2 51	2 43	2 37	2 32	2 28	2 25	48
49	7 0	6 9	5 32	5 2	4 38	4 18	4 2	3 37	3 18	3 4	2 53	2 45	2 38	2 33	2 29	2 26	49
50	7 5	6 14	5 36	5 6	4 41	4 21	4 5	3 39	3 20	3 5	2 54	2 46	2 39	2 34	2 30	2 26	50
51	7 11	6 19	5 41	5 10	4 45	4 24	4 8	3 42	3 22	3 7	2 55	2 47	2 40	2 35	2 31	2 27	51
52	7 16	6 24	5 45	5 14	4 48	4 27	4 11	3 44	3 24	3 9	2 57	2 49	2 42	2 36	2 31	2 27	52
53	7 21	6 29	5 49	5 17	4 52	4 30	4 14	3 46	3 26	3 11	2 59	2 50	2 43	2 37	2 32		53
54	7 26	6 34	5 53	5 21	4 55	4 33	4 16	3 48	3 28	3 12	3 0	2 51	2 44	2 37	2 32		54
55	7 31	6 39	5 57	5 24	4 58	4 36	4 19	3 50	3 30	3 14	3 1	2 52	2 45	2 38			55
56	7 36	6 43	6 0	5 27	5 1	4 39	4 22	3 52	3 32	3 16	3 2	2 53	2 46	2 39			56
58	7 46	6 51	6 7	5 33	5 7	4 44	4 26	3 56	3 36	3 19	3 5	2 55	2 47				58
60	7 56	6 58	6 14	5 39	5 12	4 49	4 31	4 0	3 39	3 22	3 8	2 57					60
62	8 5	7 5	6 20	5 45	5 17	4 54	4 36	4 4	3 42	3 24	3 10						62
64	8 13	7 12	6 26	5 51	5 22	4 59	4 40	4 7	3 45	3 26							64
66	8 21	7 19	6 32	5 57	5 27	5 3	4 43	4 10	3 47								66
68	8 28	7 25	6 38	6 2	5 32	5 7	4 45	4 13									68
70	8 35	7 30	6 43	6 7	5 36	5 11	4 48										70
72	8 40	7 35	6 47	6 11	5 40												72
74	8 44	7 40	6 51														74
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE XVIII.

Third Correction, to Apparent Distance 100°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR																☽'s App Alt
	32°	34°	36°	38°	40°	42°	44°	46°	48°	50°	54°	58°	62°	66°	70°	74°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	5 4	5 19	5 34	5 48	6 2	6 15	6 28	6 41	6 53	7 4	7 25	7 46	8 5	8 20	8 33	8 44	6
7	4 29	4 41	4 54	5 6	5 18	5 30	5 41	5 52	6 3	6 13	6 32	6 50	7 6	7 19	7 30	7 40	7
8	4 5	4 16	4 27	4 38	4 48	4 58	5 8	5 17	5 26	5 35	5 52	6 7	6 20	6 32	6 43	7 52	8
9	3 45	3 55	4 5	4 15	4 24	4 32	4 41	4 49	4 57	5 4	5 19	5 33	5 45	5 56	6 7		9
10	3 30	3 39	3 47	3 55	4 3	4 11	4 19	4 26	4 33	4 40	4 54	5 6	5 16	5 26	5 36		10
11	3 18	3 26	3 33	3 40	3 47	3 54	4 1	4 8	4 15	4 21	4 33	4 44	4 54	5 3	5 12		11
12	3 7	3 14	3 21	3 27	3 34	3 40	3 47	3 53	3 59	4 4	4 15	4 25	4 34	4 43	4 52		12
13	2 58	3 4	3 10	3 16	3 22	3 28	3 34	3 40	3 46	3 51	4 0	4 9	4 17	4 25			13
14	2 50	2 56	3 1	3 7	3 12	3 18	3 23	3 29	3 34	3 39	3 48	3 56	4 4	4 10			14
15	2 44	2 49	2 54	2 59	3 4	3 9	3 14	3 19	3 24	3 28	3 37	3 45	3 52	3 59			15
16	2 39	2 44	2 48	2 52	2 57	3 2	3 7	3 11	3 15	3 19	3 27	3 35	3 42	3 49			16
17	2 35	2 39	2 43	2 47	2 51	2 56	3 0	3 4	3 8	3 12	3 19	3 26	3 33				17
18	2 31	2 35	2 38	2 42	2 46	2 50	2 54	2 58	3 1	3 5	3 12	3 18	3 24				18
19	2 28	2 31	2 34	2 38	2 42	2 45	2 49	2 52	2 55	2 59	3 5	3 11	3 16				19
20	2 25	2 28	2 31	2 35	2 38	2 41	2 44	2 47	2 50	2 54	3 0	3 5	3 10				20
21	2 23	2 26	2 29	2 32	2 35	2 38	2 40	2 43	2 46	2 49	2 55	3 0					21
22	2 22	2 24	2 27	2 29	2 32	2 35	2 37	2 40	2 43	2 45	2 50	2 55					22
23	2 21	2 23	2 25	2 27	2 29	2 32	2 34	2 37	2 40	2 42	2 46	2 50					23
24	2 20	2 22	2 23	2 25	2 27	2 29	2 32	2 35	2 37	2 39	2 43	2 46					24
25	2 19	2 20	2 21	2 23	2 25	2 27	2 30	2 32	2 34	2 36	2 40						25
26	2 18	2 19	2 20	2 21	2 23	2 25	2 28	2 30	2 32	2 34	2 37						26
27	2 17	2 18	2 19	2 20	2 22	2 24	2 26	2 28	2 30	2 32	2 34						27
28	2 16	2 17	2 18	2 19	2 21	2 23	2 24	2 26	2 28	2 30	2 31						28
29	2 15	2 16	2 17	2 18	2 20	2 22	2 23	2 25	2 26	2 28							29
30	2 15	2 16	2 17	2 18	2 19	2 21	2 22	2 24	2 25	2 26							30
31	2 14	2 15	2 16	2 17	2 18	2 20	2 21	2 22	2 23	2 24							31
32	2 14	2 15	2 16	2 17	2 18	2 19	2 20	2 21	2 22	2 23							32
33	2 15	2 15	2 15	2 16	2 17	2 18	2 19	2 20	2 21								33
34	2 15	2 15	2 15	2 16	2 17	2 18	2 19	2 19	2 20								34
35	2 15	2 15	2 15	2 15	2 16	2 17	2 18	2 18									35
36	2 16	2 15	2 15	2 15	2 16	2 17	2 17	2 18									36
37	2 17	2 16	2 15	2 15	2 16	2 16	2 17										37
38	2 17	2 16	2 15	2 15	2 16	2 16	2 17										38
39	2 18	2 17	2 16	2 16	2 16	2 16											39
40	2 18	2 17	2 16	2 16	2 16	2 16											40
41	2 19	2 18	2 17	2 16	2 16												41
42	2 19	2 18	2 17	2 16	2 16												42
43	2 20	2 18	2 17	2 16													43
44	2 20	2 19	2 17	2 16													44
45	2 21	2 19	2 17														45
46	2 21	2 19	2 17														46
47	2 22	2 19															47
48	2 22	2 19															48
49	2 23																49
50	2 23																50
51																	
52																	
53																	
54																	
55																	
56																	
58																	
60																	
62																	
64																	
66																	
68																	
70																	
72																	
74																	
	32°	34°	36°	38°	40°	42°	44°	46°	48°	50°	54°						

TABLE *P*. EFFECT OF SUN'S PAR

To be subtracted from the third Correction.

☽'s App Alt.	Sun's Apparent Altitude.									
	5	10	20	30	40	50	60	70	75	80
	″	″	″	″	″	″	″	″	″	″
5	1	1	1	2	2	2	2	2	2	
10	2	2	2	2	3	3	3	3		
15	2	3	3	3	3	4	4	4		
20	3	3	4	4	4	4	4			
25	4	4	4	5	5	5	5			
30	5	5	5	5	6	6				
35	5	5	6	6	6	6				
40	6	6	6	7	7					
45	7	7	7	7						
50	7	7	7	8						
55	8	8	8							
60	8	8	8							
65	8	9								
70	9	9								
75	9									

TABLE XVIII

THIRD CORRECTION, to APPARENT DISTANCE 104°

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	2 20	2 22	2 25	2 29	2 33	2 39	2 45	2 58	3 13	3 28	3 43	3 59	4 15	4 30	4 46	5 1	6
7	2 23	2 20	2 22	2 25	2 28	2 32	2 36	2 46	2 57	3 10	3 23	3 36	3 48	4 1	4 14	4 27	7
8	2 26	2 22	2 26	2 22	2 24	2 27	2 30	2 38	2 47	2 57	3 8	3 20	3 31	3 42	3 53	4 4	8
9	2 30	2 25	2 22	2 21	2 22	2 24	2 26	2 32	2 39	2 48	2 57	3 7	3 17	3 26	3 36	3 46	9
10	2 36	2 29	2 25	2 22	2 21	2 22	2 24	2 28	2 34	2 41	2 48	2 56	3 5	3 14	3 23	3 31	10
11	2 42	2 34	2 28	2 24	2 22	2 21	2 22	2 25	2 30	2 35	2 41	2 48	2 55	3 4	3 11	3 19	11
12	2 48	2 39	2 32	2 27	2 24	2 22	2 21	2 23	2 27	2 31	2 36	2 42	2 48	2 56	3 2	3 9	12
13	2 55	2 44	2 36	2 30	2 26	2 24	2 22	2 22	2 25	2 28	2 32	2 38	2 43	2 49	2 55	3 1	13
14	3 2	2 49	2 40	2 33	2 29	2 26	2 24	2 22	2 23	2 26	2 30	2 34	2 39	2 43	2 48	2 54	14
15	3 9	2 54	2 45	2 37	2 32	2 28	2 26	2 23	2 22	2 25	2 28	2 31	2 35	2 39	2 43	2 48	15
16	3 16	3 0	2 50	2 41	2 35	2 31	2 28	2 24	2 22	2 24	2 26	2 29	2 32	2 35	2 39	2 44	16
17	3 23	3 6	2 55	2 45	2 38	2 33	2 30	2 26	2 23	2 23	2 25	2 27	2 30	2 33	2 36	2 40	17
18	3 31	3 13	3 0	2 49	2 41	2 36	2 33	2 27	2 24	2 22	2 24	2 26	2 28	2 31	2 34	2 37	18
19	3 38	3 19	3 5	2 53	2 45	2 39	2 35	2 29	2 25	2 23	2 23	2 24	2 26	2 29	2 31	2 34	19
20	3 46	3 25	3 11	2 58	2 49	2 43	2 38	2 31	2 27	2 24	2 22	2 23	2 25	2 27	2 29	2 32	20
21	3 54	3 32	3 16	3 3	2 53	2 46	2 41	2 33	2 28	2 25	2 23	2 22	2 24	2 26	2 28	2 30	21
22	4 2	3 38	3 22	3 8	2 57	2 50	2 44	2 35	2 30	2 26	2 24	2 22	2 23	2 25	2 27	2 29	22
23	4 10	3 45	3 27	3 13	3 2	2 54	2 47	2 38	2 32	2 28	2 25	2 23	2 22	2 24	2 26	2 28	23
24	4 18	3 51	3 33	3 18	3 6	2 57	2 50	2 40	2 33	2 29	2 26	2 24	2 22	2 23	2 25	2 27	24
25	4 26	3 58	3 39	3 22	3 10	3 1	2 54	2 42	2 35	2 30	2 27	2 24	2 23	2 23	2 24	2 26	25
26	4 33	4 4	3 44	3 27	3 15	3 5	2 57	2 44	2 36	2 31	2 28	2 25	2 24	2 23	2 24	2 26	26
27	4 41	4 11	3 50	3 32	3 19	3 9	3 0	2 47	2 38	2 32	2 29	2 26	2 24	2 23	2 24	2 25	27
28	4 49	4 18	3 56	3 37	3 23	3 12	3 3	2 49	2 40	2 34	2 30	2 27	2 25	2 24	2 24	2 25	28
29	4 57	4 24	4 1	3 42	3 28	3 16	3 7	2 52	2 42	2 35	2 31	2 28	2 26	2 25	2 24	2 25	29
30	5 4	4 30	4 7	3 47	3 32	3 20	3 10	2 55	2 44	2 37	2 33	2 30	2 27	2 25	2 24	2 24	30
31	5 12	4 37	4 13	3 52	3 36	3 24	3 14	2 58	2 46	2 39	2 34	2 31	2 28	2 26	2 25	2 24	31
32	5 19	4 44	4 19	3 57	3 41	3 28	3 17	3 0	2 49	2 41	2 36	2 32	2 29	2 27	2 26	2 25	32
33	5 27	4 51	4 25	4 2	3 46	3 32	3 21	3 3	2 51	2 43	2 37	2 33	2 30	2 28	2 26	2 25	33
34	5 34	4 58	4 30	4 7	3 50	3 36	3 24	3 5	2 54	2 45	2 39	2 34	2 31	2 29	2 27	2 26	34
35	5 42	5 4	4 36	4 12	3 55	3 40	3 27	3 8	2 56	2 47	2 40	2 35	2 32	2 30	2 28	2 27	35
36	5 49	5 10	4 41	4 17	3 59	3 44	3 31	3 11	2 58	2 49	2 42	2 37	2 33	2 30	2 28	2 27	36
37	5 56	5 16	4 46	4 21	4 3	3 47	3 35	3 14	3 1	2 51	2 43	2 38	2 34	2 31	2 29	2 27	37
38	6 3	5 22	4 51	4 26	4 7	3 51	3 38	3 17	3 4	2 53	2 45	2 39	2 35	2 32	2 30	2 28	38
39	6 10	5 28	4 56	4 31	4 11	3 55	3 41	3 20	3 6	2 55	2 47	2 41	2 36	2 33	2 31	2 29	39
40	6 16	5 33	5 1	4 36	4 15	3 59	3 45	3 23	3 9	2 57	2 49	2 42	2 37	2 34	2 32	2 30	40
41	6 23	5 39	5 6	4 40	4 19	4 3	3 49	3 26	3 11	2 59	2 51	2 44	2 39	2 35	2 32	2 30	41
42	6 30	5 44	5 11	4 44	4 23	4 6	3 53	3 29	3 13	3 1	2 52	2 45	2 40	2 36	2 33	2 31	42
43	6 37	5 50	5 16	4 49	4 27	4 10	3 56	3 32	3 15	3 3	2 54	2 47	2 41	2 37	2 34	2 31	43
44	6 43	5 55	5 21	4 53	4 31	4 13	3 59	3 35	3 18	3 5	2 55	2 48	2 42	2 38	2 35	2 32	44
45	6 50	6 1	5 26	4 58	4 35	4 17	4 2	3 38	3 20	3 6	2 57	2 50	2 44	2 39	2 35	2 32	45
46	6 56	6 6	5 31	5 2	4 39	4 20	4 5	3 40	3 22	3 8	2 58	2 51	2 45	2 40	2 36	2 33	46
47	7 2	6 12	5 36	5 6	4 43	4 24	4 8	3 43	3 24	3 10	3 0	2 52	2 46	2 41	2 37	2 34	47
48	7 8	6 17	5 40	5 10	4 46	4 27	4 11	3 45	3 26	3 12	3 1	2 53	2 48	2 42	2 38	2 34	48
49	7 14	6 23	5 45	5 14	4 50	4 30	4 14	3 47	3 28	3 14	3 3	2 55	2 49	2 43	2 38		49
50	7 20	6 28	5 49	5 18	4 53	4 33	4 17	3 50	3 30	3 16	3 4	2 56	2 50	2 44	2 39		50
51	7 26	6 33	5 53	5 22	4 57	4 36	4 20	3 52	3 32	3 18	3 6	2 58	2 51	2 45			51
52	7 32	6 38	5 57	5 26	5 0	4 39	4 23	3 54	3 34	3 20	3 8	2 59	2 52	2 45			52
53	7 37	6 43	6 2	5 29	5 4	4 42	4 26	3 56	3 36	3 22	3 9	3 0	2 52				53
54	7 42	6 48	6 6	5 33	5 7	4 45	4 29	3 58	3 38	3 23	3 10	3 1	2 53				54
55	7 47	6 53	6 10	5 36	5 10	4 48	4 32	4 0	3 40	3 25	3 12	3 1					55
56	7 52	6 57	6 14	5 40	5 13	4 51	4 34	4 3	3 42	3 26	3 13	3 2					56
57	7 57	7 1	6 18	5 44	5 16	4 54	4 37	4 5	3 44	3 28	3 14						57
58	8 2	7 5	6 22	5 47	5 19	4 57	4 39	4 7	3 46	3 29	3 15						58
59	8 6	7 9	6 26	5 50	5 22	5 0	4 41	4 9	3 48	3 31							59
60	8 10	7 13	6 30	5 53	5 25	5 2	4 43	4 11	3 50	3 32							60
62	8 19	7 19	6 36	5 59	5 30	5 6	4 47	4 15	3 52								62
64	8 27	7 26	6 42	6 4	5 35	5 10	4 51	4 19									64
66	8 35	7 33	6 47	6 9	5 40	5 14	4 54										66
68	8 43	7 39	6 52	6 14	5 45												68
70	8 49	7 45	6 57														70
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 104°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	32°	34°	36°	38°	40°	42°	44°	46°	48°	50°	52°	54°	58°	62°	66°	70°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	5 16	5 31	5 45	6 0	6 14	6 28	6 41	6 54	7 6	7 18	7 29	7 40	8 0	8 19	8 35	8 49	6
7	4 42	4 56	5 8	5 20	5 31	5 42	5 53	6 4	6 15	6 26	6 37	6 47	7 4	7 19	7 33	7 46	7
8	4 16	4 28	4 39	4 49	4 59	5 9	5 19	5 28	5 38	5 47	5 57	6 6	6 21	6 34	6 46	6 57	8
9	3 55	4 5	4 15	4 25	4 34	4 43	4 52	5 0	5 8	5 16	5 24	5 32	5 46	5 58	6 9		9
10	3 40	3 49	3 58	4 7	4 15	4 23	4 31	4 38	4 45	4 52	4 59	5 6	5 18	5 30	5 40		10
11	3 27	3 35	3 43	3 51	3 58	4 5	4 12	4 19	4 26	4 32	4 38	4 44	4 55	5 6	5 16		11
12	3 16	3 23	3 30	3 37	3 44	3 51	3 58	4 4	4 10	4 17	4 23	4 28	4 38	4 47	4 56		12
13	3 7	3 13	3 20	3 26	3 33	3 39	3 45	3 51	3 56	4 2	4 7	4 12	4 22	4 30			13
14	2 59	3 5	3 11	3 17	3 23	3 29	3 34	3 39	3 44	3 49	3 54	3 59	4 8	4 15			14
15	2 53	2 58	3 4	3 9	3 15	3 20	3 25	3 29	3 34	3 38	3 43	3 47	3 56	4 3			15
16	2 48	2 53	2 58	3 3	3 8	3 12	3 17	3 21	3 25	3 29	3 33	3 37	3 45	3 52			16
17	2 44	2 49	2 53	2 58	3 2	3 6	3 10	3 14	3 17	3 21	3 25	3 29	3 36				17
18	2 41	2 45	2 49	2 53	2 57	3 1	3 4	3 8	3 11	3 15	3 18	3 22	3 29				18
19	2 38	2 41	2 45	2 49	2 53	2 56	2 59	3 3	3 6	3 9	3 12	3 16	3 22				19
20	2 35	2 38	2 42	2 45	2 49	2 52	2 55	2 58	3 1	3 4	3 7	3 10	3 16				20
21	2 33	2 36	2 39	2 42	2 45	2 48	2 51	2 54	2 57	3 0	3 3	3 5					21
22	2 31	2 34	2 36	2 39	2 42	2 45	2 47	2 50	2 53	2 56	2 59	3 1					22
23	2 30	2 32	2 34	2 37	2 39	2 42	2 44	2 47	2 50	2 53	2 55	2 57					23
24	2 29	2 31	2 33	2 35	2 37	2 40	2 42	2 44	2 47	2 50	2 52	2 54					24
25	2 28	2 29	2 31	2 33	2 35	2 38	2 40	2 42	2 44	2 47	2 49						25
26	2 27	2 28	2 30	2 32	2 34	2 36	2 38	2 40	2 42	2 44	2 46						26
27	2 26	2 27	2 29	2 31	2 32	2 34	2 36	2 38	2 40	2 41							27
28	2 26	2 27	2 28	2 30	2 31	2 33	2 35	2 36	2 38	2 39							28
29	2 25	2 26	2 27	2 29	2 30	2 32	2 33	2 34	2 36								29
30	2 25	2 26	2 27	2 28	2 29	2 31	2 32	2 33	2 34								30
31	2 24	2 25	2 26	2 27	2 28	2 30	2 31	2 32									31
32	2 24	2 25	2 26	2 27	2 28	2 29	2 30	2 31									32
33	2 24	2 24	2 25	2 26	2 27	2 28	2 29										33
34	2 25	2 24	2 25	2 26	2 27	2 27	2 28										34
35	2 26	2 25	2 25	2 26	2 26	2 27											35
36	2 26	2 25	2 25	2 26	2 26	2 27											36
37	2 26	2 25	2 25	2 26	2 26												37
38	2 27	2 26	2 26	2 26	2 26												38
39	2 27	2 26	2 26	2 26													39
40	2 28	2 27	2 26	2 26													40
41	2 28	2 27	2 26														41
42	2 29	2 27	2 26														42
43	2 29	2 27															43
44	2 30	2 28															44
45	2 30																45
46	2 31																46
47																	47
48																	48
49																	49
50																	50
51																	
52																	
53																	
54																	
55																	
56																	
57																	
58																	
59																	
60																	
62																	
64																	
66																	
68																	
70																	
	32°	34°	36°	38°	40°	42°	44°	46°	48°	50°	52°						

TABLE *P*. EFFECT OF SUN'S PAR.

To be subtracted from the third Correction.

☽'s App Alt.	Sun's Apparent Altitude.									
	5	10	20	30	40	50	60	70	80	90
	″	″	″	″	″	″	″	″	″	″
5	1	1	2	2	2	2	3	3		
10	2	2	2	3	3	3	4	4		
15	2	3	3	3	4	4	4	4		
20	3	4	4	4	5	5	5			
25	4	4	5	5	5	6				
30	5	5	5	6	6	6				
35	6	6	6	6	7					
40	6	6	7	7	7					
45	7	7	7	8						
50	7	8	8							
55	8	8	8							
60	8	8								
65	9	9								
70	9									

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 108°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	2 30	2 32	2 35	2 39	2 44	2 50	2 56	3 9	3 24	3 39	3 55	4 11	4 27	4 43	4 59	5 15	6
7	2 33	2 30	2 32	2 35	2 39	2 43	2 48	2 58	3 10	3 22	3 35	3 48	4 2	4 15	4 28	4 41	7
8	2 36	2 32	2 30	2 32	2 35	2 38	2 42	2 49	2 58	3 9	3 20	3 31	3 42	3 54	4 6	4 17	8
9	2 40	2 35	2 32	2 31	2 33	2 35	2 38	2 43	2 50	2 58	3 8	3 18	3 28	3 38	3 48	3 58	9
10	2 46	2 39	2 35	2 33	2 31	2 33	2 35	2 39	2 44	2 51	2 59	3 7	3 16	3 25	3 34	3 43	10
11	2 52	2 44	2 38	2 35	2 33	2 32	2 33	2 37	2 41	2 46	2 53	3 0	3 7	3 15	3 23	3 30	11
12	2 59	2 49	2 42	2 38	2 35	2 33	2 32	2 35	2 39	2 43	2 48	2 54	3 0	3 7	3 14	3 20	12
13	3 6	2 54	2 46	2 41	2 37	2 35	2 33	2 34	2 37	2 40	2 44	2 49	2 54	3 0	3 6	3 12	13
14	3 13	2 59	2 51	2 44	2 40	2 37	2 35	2 33	2 35	2 38	2 41	2 45	2 49	2 54	2 59	3 5	14
15	3 20	3 5	2 56	2 48	2 43	2 39	2 37	2 34	2 34	2 36	2 39	2 42	2 46	2 50	2 54	2 59	15
16	3 28	3 11	3 1	2 52	2 46	2 42	2 39	2 35	2 33	2 35	2 37	2 40	2 43	2 46	2 50	2 54	16
17	3 35	3 17	3 6	2 56	2 49	2 45	2 42	2 37	2 34	2 34	2 35	2 38	2 40	2 43	2 47	2 50	17
18	3 43	3 24	3 11	3 0	2 53	2 48	2 44	2 39	2 35	2 33	2 34	2 36	2 38	2 41	2 44	2 47	18
19	3 50	3 31	3 17	3 5	2 57	2 51	2 46	2 40	2 36	2 34	2 33	2 35	2 37	2 39	2 42	2 45	19
20	3 58	3 37	3 22	3 10	3 1	2 54	2 49	2 42	2 38	2 35	2 33	2 34	2 36	2 38	2 40	2 43	20
21	4 6	3 44	3 28	3 14	3 4	2 57	2 52	2 44	2 39	2 36	2 34	2 34	2 35	2 37	2 39	2 41	21
22	4 14	3 51	3 34	3 19	3 8	3 0	2 55	2 46	2 41	2 37	2 35	2 34	2 35	2 36	2 38	2 40	22
23	4 22	3 58	3 40	3 24	3 12	3 4	2 58	2 48	2 42	2 38	2 36	2 34	2 34	2 35	2 37	2 39	23
24	4 30	4 4	3 46	3 29	3 17	3 8	3 1	2 50	2 44	2 40	2 37	2 35	2 34	2 35	2 36	2 38	24
25	4 38	4 11	3 51	3 34	3 22	3 12	3 4	2 53	2 46	2 41	2 38	2 36	2 34	2 34	2 35	2 37	25
26	4 46	4 18	3 57	3 39	3 26	3 16	3 8	2 55	2 48	2 43	2 39	2 37	2 35	2 34	2 35	2 36	26
27	4 54	4 25	4 3	3 44	3 31	3 20	3 11	2 58	2 50	2 44	2 40	2 38	2 36	2 35	2 34	2 35	27
28	5 2	4 31	4 9	3 49	3 35	3 21	3 15	3 0	2 52	2 46	2 42	2 39	2 37	2 35	2 34	2 35	28
29	5 10	4 37	4 15	3 54	3 40	3 28	3 18	3 3	2 54	2 47	2 43	2 40	2 38	2 36	2 35	2 35	29
30	5 18	4 44	4 21	3 59	3 44	3 32	3 22	3 6	2 56	2 49	2 45	2 41	2 38	2 36	2 35	2 35	30
31	5 26	4 51	4 27	4 4	3 48	3 36	3 25	3 9	2 58	2 50	2 46	2 42	2 39	2 37	2 36	2 35	31
32	5 33	4 58	4 33	4 9	3 52	3 40	3 28	3 11	3 0	2 52	2 47	2 43	2 40	2 38	2 37	2 36	32
33	5 41	5 5	4 38	4 14	3 57	3 44	3 32	3 14	3 2	2 54	2 48	2 44	2 41	2 39	2 37	2 36	33
34	5 48	5 11	4 43	4 19	4 1	3 47	3 36	3 17	3 5	2 56	2 50	2 45	2 42	2 40	2 38	2 37	34
35	5 56	5 18	4 49	4 24	4 5	3 51	3 39	3 20	3 7	2 58	2 51	2 46	2 43	2 41	2 39	2 37	35
36	6 3	5 24	4 55	4 29	4 10	3 55	3 42	3 23	3 9	3 0	2 53	2 48	2 44	2 42	2 40	2 38	36
37	6 10	5 30	5 0	4 34	4 14	3 59	3 46	3 26	3 12	3 2	2 55	2 49	2 45	2 42	2 40	2 38	37
38	6 17	5 36	5 5	4 39	4 19	4 3	3 50	3 29	3 15	3 4	2 57	2 51	2 46	2 43	2 41	2 39	38
39	6 24	5 42	5 10	4 44	4 24	4 7	3 54	3 32	3 17	3 6	2 58	2 52	2 47	2 44	2 42	2 40	39
40	6 31	5 48	5 15	4 49	4 28	4 11	3 57	3 35	3 20	3 8	3 0	2 54	2 49	2 45	2 43	2 40	40
41	6 38	5 54	5 20	4 54	4 33	4 15	4 1	3 38	3 22	3 10	3 1	2 55	2 50	2 46	2 43	2 41	41
42	6 45	5 59	5 25	4 58	4 37	4 18	4 5	3 41	3 24	3 12	3 3	2 56	2 51	2 47	2 44	2 41	42
43	6 52	6 5	5 30	5 3	4 41	4 22	4 9	3 44	3 27	3 14	3 5	2 58	2 52	2 48	2 45	2 42	43
44	6 59	6 11	5 36	5 7	4 45	4 26	4 12	3 47	3 29	3 16	3 6	2 59	2 53	2 49	2 46	2 43	44
45	7 6	6 17	5 41	5 12	4 49	4 30	4 16	3 50	3 31	3 18	3 8	3 1	2 55	2 50	2 47		45
46	7 12	6 22	5 46	5 16	4 53	4 34	4 19	3 52	3 33	3 20	3 10	3 2	2 56	2 51	2 47		46
47	7 18	6 27	5 51	5 20	4 57	4 37	4 22	3 55	3 36	3 22	3 12	3 4	2 58	2 52			47
48	7 24	6 32	5 56	5 24	5 0	4 41	4 25	3 57	3 38	3 24	3 13	3 5	2 59	2 53			48
49	7 30	6 37	6 1	5 28	5 4	4 44	4 28	4 0	3 41	3 26	3 15	3 7	3 0				49
50	7 36	6 42	6 5	5 32	5 7	4 47	4 31	4 2	3 43	3 28	3 17	3 8	3 1				50
51	7 42	6 47	6 10	5 36	5 11	4 50	4 34	4 5	3 45	3 30	3 18	3 9					51
52	7 47	6 52	6 14	5 40	5 14	4 53	4 37	4 7	3 47	3 32	3 19	3 10					52
53	7 53	6 57	6 18	5 43	5 18	4 56	4 39	4 10	3 49	3 34	3 20						53
54	7 58	7 2	6 22	5 47	5 21	4 59	4 42	4 12	3 51	3 35	3 21						54
55	8 4	7 7	6 26	5 51	5 24	5 2	4 45	4 14	3 53	3 36							55
56	8 9	7 11	6 30	5 54	5 27	5 5	4 47	4 16	3 55	3 38							56
57	8 14	7 16	6 34	5 58	5 30	5 8	4 50	4 18	3 57								57
58	8 19	7 20	6 38	6 1	5 33	5 11	4 52	4 20	3 58								58
59	8 24	7 25	6 42	6 4	5 36	5 14	4 54	4 22									59
60	8 28	7 29	6 45	6 8	5 39	5 16	4 56	4 24									60
61	8 33	7 33	6 48	6 11	5 42	5 19	4 58										61
62	8 37	7 37	6 51	6 14	5 45	5 21	5 0										62
63	8 41	7 40	6 54	6 17	5 48	5 23											63
64	8 45	7 43	6 57	6 20													64
66	8 53	7 46	7 0														66
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE XVIII.

Third Correction, to Apparent Distance 108°.

)'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																)'s App Alt.
	32°	34°	36°	38°	40°	42°	44°	46°	48°	50°	52°	54°	56°	58°	62°	66°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	5 30	5 45	6 0	6 15	6 29	6 44	6 58	7 11	7 23	7 34	7 45	7 56	8 6	8 16	8 35	8 53	6
7	4 55	5 8	5 21	5 31	5 46	5 58	6 10	6 22	6 33	6 43	6 53	7 2	7 11	7 20	7 35	7 47	7
8	4 29	4 41	4 52	5 3	5 13	5 23	5 34	5 44	5 54	6 4	6 13	6 22	6 30	6 38	6 51	7 1	8
9	4 8	4 18	4 28	4 38	4 48	4 57	5 6	5 15	5 23	5 31	5 38	5 45	5 53	6 1	6 14		9
10	3 52	4 0	4 9	4 18	4 27	4 36	4 44	4 52	4 59	5 6	5 13	5 20	5 27	5 33	5 45		10
11	3 38	3 46	3 51	4 2	4 10	4 18	4 25	4 33	4 40	4 47	4 53	4 59	5 5	5 11	5 20		11
12	3 27	3 31	3 41	3 48	3 56	4 4	4 11	4 18	4 24	4 30	4 36	4 42	4 47	4 52	5 0		12
13	3 18	3 24	3 30	3 37	3 44	3 51	3 58	4 4	4 10	4 15	4 21	4 26	4 30	4 31			13
14	3 10	3 16	3 22	3 28	3 34	3 40	3 46	3 52	3 58	4 3	4 8	4 12	4 16	4 20			14
15	3 4	3 9	3 14	3 20	3 25	3 31	3 36	3 42	3 47	3 52	3 56	4 1	4 5	4 8			15
16	2 59	3 3	3 8	3 13	3 18	3 23	3 28	3 33	3 38	3 43	3 47	3 51	3 55	3 58			16
17	2 54	2 58	3 3	3 7	3 12	3 17	3 21	3 26	3 30	3 35	3 39	3 43	3 46				17
18	2 51	2 54	2 59	3 3	3 7	3 11	3 15	3 20	3 24	3 28	3 32	3 35	3 38				18
19	2 48	2 51	2 55	2 59	3 3	3 6	3 10	3 14	3 18	3 22	3 25	3 28					19
20	2 46	2 49	2 52	2 56	2 59	3 2	3 6	3 9	3 13	3 16	3 19	3 22					20
21	2 44	2 47	2 50	2 53	2 56	2 59	3 2	3 5	3 9	3 12	3 14						21
22	2 42	2 45	2 48	2 50	2 53	2 56	2 59	3 2	3 5	3 8	3 10						22
23	2 41	2 43	2 46	2 48	2 50	2 53	2 56	2 59	3 2	3 4							23
24	2 40	2 42	2 44	2 46	2 48	2 51	2 53	2 56	2 59	3 1							24
25	2 39	2 40	2 42	2 44	2 46	2 49	2 51	2 53	2 56								25
26	2 38	2 39	2 41	2 43	2 45	2 47	2 49	2 51	2 54								26
27	2 37	2 38	2 40	2 42	2 44	2 45	2 47	2 49									27
28	2 36	2 38	2 39	2 41	2 42	2 44	2 46	2 47									28
29	2 36	2 37	2 38	2 40	2 41	2 42	2 44										29
30	2 35	2 36	2 37	2 39	2 40	2 41	2 43										30
31	2 35	2 36	2 37	2 38	2 39	2 40											31
32	2 35	2 36	2 37	2 38	2 39	2 40											32
33	2 36	2 36	2 36	2 37	2 38												33
34	2 36	2 36	2 36	2 37	2 38												34
35	2 36	2 36	2 36	2 37													35
36	2 37	2 36	2 36	2 36													36
37	2 38	2 37	2 36														37
38	2 38	2 37	2 36														38
39	2 39	2 38															39
40	2 39	2 38															40
41	2 40																41
42	2 40																42
43																	43
44																	44
45																	45
46																	46
47																	47
48																	48
49																	49
50																	50
51																	
52																	
53																	
54																	
55																	
56																	
57																	
58																	
59																	
60																	
61																	
62																	
63																	
64																	
66																	
	32°	34°	36°	38°	40°	42°	44°	46°	48°	50°	52°						

TABLE P. EFFECT OF SUN's PAR.

To be subtracted from the third Correction.

)'s App. Alt.	Sun's Apparent Altitude.									
	5	10	20	30	40	50	60	65	80	90
	″	″	″	″	″	″	″	″	″	″
5	1	1	2	2	3	3	3	3		
10	2	2	3	3	4	4	4			
15	3	3	3	4	4	5	5			
20	4	4	4	5	5	5				
25	4	4	5	6	6	6				
30	5	5	6	6	7					
35	6	6	6	7	7					
40	6	7	7	8						
45	7	7	8	8						
50	8	8	8							
55	8	8	9							
60	8	9								
65	9									
70										

TABLE XVIII.

THIRD CORRECTION to APPARENT DISTANCE 112°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	2 40	2 42	2 45	2 49	2 54	3 0	3 7	3 21	3 36	3 52	4 8	4 24	4 40	4 56	5 12	5 28	6
7	2 42	2 40	2 42	2 45	2 49	2 53	2 58	3 8	3 20	3 33	3 46	3 59	4 13	4 26	4 40	4 54	7
8	2 46	2 42	2 41	2 43	2 45	2 48	2 52	3 0	3 9	3 19	3 31	3 42	3 54	4 6	4 18	4 30	8
9	2 51	2 45	2 43	2 41	2 43	2 45	2 48	2 54	3 1	3 9	3 19	3 29	3 40	3 50	4 0	4 11	9
10	2 57	2 49	2 45	2 43	2 42	2 43	2 45	2 49	2 55	3 2	3 10	3 19	3 28	3 37	3 46	3 56	10
11	3 3	2 54	2 48	2 45	2 43	2 42	2 43	2 46	2 50	2 56	3 3	3 11	3 19	3 27	3 35	3 44	11
12	3 9	2 59	2 52	2 48	2 45	2 43	2 42	2 44	2 47	2 52	2 58	3 5	3 12	3 19	3 26	3 34	12
13	3 16	3 4	2 56	2 51	2 47	2 45	2 43	2 43	2 45	2 49	2 54	3 0	3 6	3 12	3 18	3 25	13
14	3 23	3 10	3 0	2 54	2 50	2 47	2 45	2 43	2 44	2 47	2 51	2 56	3 1	3 6	3 12	3 17	14
15	3 31	3 16	3 5	2 58	2 53	2 49	2 47	2 44	2 44	2 46	2 49	2 53	2 57	3 1	3 6	3 11	15
16	3 39	3 22	3 10	3 2	2 56	2 51	2 48	2 45	2 43	2 45	2 47	2 50	2 54	2 57	3 2	3 6	16
17	3 47	3 29	3 15	3 6	2 59	2 54	2 50	2 46	2 44	2 44	2 46	2 48	2 51	2 54	2 58	3 2	17
18	3 55	3 35	3 20	3 10	3 2	2 57	2 53	2 48	2 45	2 44	2 45	2 47	2 49	2 52	2 55	2 59	18
19	4 3	3 41	3 26	3 15	3 6	3 0	2 56	2 50	2 46	2 45	2 44	2 46	2 48	2 50	2 53	2 56	19
20	4 11	3 48	3 32	3 20	3 10	3 3	2 58	2 52	2 48	2 45	2 44	2 45	2 47	2 49	2 51	2 54	20
21	4 19	3 54	3 38	3 25	3 15	3 7	3 1	2 54	2 49	2 46	2 44	2 44	2 46	2 48	2 50	2 52	21
22	4 27	4 1	3 44	3 30	3 20	3 11	3 5	2 56	2 51	2 47	2 45	2 44	2 45	2 47	2 49	2 51	22
23	4 35	4 8	3 50	3 35	3 24	3 15	3 8	2 58	2 52	2 48	2 46	2 45	2 44	2 46	2 48	2 50	23
24	4 43	4 15	3 56	3 40	3 28	3 19	3 11	3 1	2 54	2 49	2 47	2 45	2 44	2 45	2 47	2 49	24
25	4 52	4 22	4 3	3 46	3 33	3 23	3 15	3 3	2 55	2 51	2 48	2 46	2 45	2 44	2 46	2 48	25
26	5 0	4 29	4 9	3 51	3 38	3 27	3 18	3 5	2 57	2 52	2 49	2 47	2 45	2 44	2 45	2 47	26
27	5 8	4 37	4 15	3 56	3 42	3 31	3 22	3 8	2 59	2 54	2 51	2 48	2 45	2 45	2 45	2 46	27
28	5 16	4 44	4 21	4 2	3 47	3 36	3 26	3 11	3 2	2 56	2 52	2 49	2 46	2 46	2 45	2 46	28
29	5 24	4 51	4 27	4 7	3 52	3 40	3 31	3 14	3 5	2 58	2 53	2 50	2 46	2 46	2 45	2 46	29
30	5 32	4 57	4 33	4 12	3 57	3 45	3 35	3 17	3 7	3 0	2 55	2 52	2 47	2 47	2 46	2 46	30
31	5 40	5 4	4 39	4 17	4 2	3 49	3 39	3 20	3 9	3 2	2 57	2 53	2 49	2 48	2 47	2 46	31
32	5 48	5 10	4 45	4 22	4 7	3 54	3 43	3 23	3 12	3 4	2 58	2 54	2 51	2 49	2 47	2 46	32
33	5 56	5 17	4 51	4 28	4 12	3 58	3 46	3 26	3 14	3 6	3 0	2 55	2 52	2 50	2 48	2 47	33
34	6 4	5 24	4 56	4 33	4 16	4 2	3 50	3 29	3 17	3 8	3 2	2 57	2 53	2 51	2 49	2 48	34
35	6 11	5 31	5 2	4 38	4 21	4 6	3 53	3 32	3 19	3 10	3 4	2 59	2 55	2 52	2 50	2 49	35
36	6 19	5 37	5 7	4 43	4 25	4 10	3 57	3 35	3 21	3 12	3 5	3 0	2 56	2 53	2 51	2 49	36
37	6 26	5 44	5 13	4 48	4 29	4 14	4 1	3 38	3 24	3 14	3 7	3 1	2 57	2 54	2 52	2 50	37
38	6 33	5 50	5 18	4 53	4 33	4 17	4 4	3 41	3 26	3 16	3 9	3 3	2 58	2 55	2 53	2 51	38
39	6 41	5 56	5 24	4 58	4 37	4 21	4 8	3 44	3 29	3 18	3 10	3 4	2 59	2 56	2 54	2 52	39
40	6 48	6 2	5 29	5 3	4 41	4 25	4 11	3 47	3 32	3 20	3 12	3 6	3 1	2 57	2 55	2 53	40
41	6 55	6 8	5 35	5 8	4 45	4 28	4 15	3 50	3 35	3 22	3 13	3 7	3 2	2 58	2 55		41
42	7 2	6 14	5 40	5 13	4 49	4 32	4 18	3 53	3 38	3 25	3 15	3 8	3 3	2 59	2 56		42
43	7 8	6 20	5 46	5 18	4 53	4 36	4 22	3 56	3 40	3 27	3 17	3 10	3 5	3 0			43
44	7 15	6 26	5 51	5 23	4 58	4 40	4 25	3 59	3 42	3 29	3 19	3 12	3 6	3 1			44
45	7 22	6 32	5 56	5 28	5 3	4 44	4 28	4 2	3 45	3 31	3 21	3 14	3 8				45
46	7 28	6 38	6 2	5 33	5 8	4 47	4 31	4 5	3 47	3 33	3 23	3 15	3 9				46
47	7 35	6 44	6 7	5 37	5 12	4 51	4 34	4 8	3 50	3 36	3 25	3 16					47
48	7 42	6 49	6 12	5 41	5 16	4 55	4 38	4 11	3 52	3 38	3 26	3 17					48
49	7 48	6 54	6 16	5 45	5 20	4 58	4 41	4 14	3 55	3 40	3 28						49
50	7 55	6 59	6 21	5 49	5 23	5 2	4 44	4 17	3 57	3 42	3 29						50
51	8 1	7 4	6 25	5 53	5 27	5 5	4 47	4 19	3 59	3 44							51
52	8 7	7 9	6 29	5 57	5 30	5 8	4 50	4 22	4 1	3 46							52
53	8 13	7 14	6 34	6 1	5 34	5 12	4 53	4 24	4 3								53
54	8 19	7 19	6 38	6 5	5 37	5 15	4 56	4 26	4 4								54
55	8 25	7 23	6 42	6 8	5 41	5 18	4 59	4 28									55
56	8 30	7 28	6 47	6 12	5 44	5 21	5 1	4 30									56
57	8 35	7 33	6 51	6 15	5 47	5 24	5 4										57
58	8 40	7 38	6 55	6 19	5 50	5 27	5 6										58
59	8 45	7 43	6 59	6 22	5 53	5 29											59
60	8 50	7 48	7 2	6 25	5 56												60
61	8 54	7 52	7 5	6 28													61
62	8 58	7 56	7 8														62
63	9 2	7 59															63
64	9 5																64
65																	65
	6°	7°	8°	9°	10°	11°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 112°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	32°	34°	36°	38°	40°	42°	44°	46°	48°	50°	52°	54°	56°	58°	60°	62°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	5 44	6 0	6 16	6 31	6 46	7 0	7 14	7 27	7 40	7 53	8 5	8 18	8 30	8 41	8 50	8 58	6
7	5 7	5 21	5 34	5 47	6 0	6 13	6 25	6 37	6 49	7 0	7 10	7 20	7 30	7 39	7 47	7 55	7
8	4 42	4 54	5 5	5 16	5 27	5 38	5 49	6 0	6 10	6 20	6 29	6 38	6 47	6 55	7 2	7 8	8
9	4 21	4 32	4 42	4 52	5 1	5 11	5 21	5 31	5 40	5 48	5 56	6 4	6 11	6 18	6 24		9
10	4 5	4 14	4 23	4 32	4 40	4 49	4 58	5 7	5 15	5 23	5 31	5 38	5 44	5 50	5 55		10
11	3 52	4 0	4 8	4 16	4 23	4 31	4 39	4 47	4 55	5 2	5 8	5 14	5 19	5 24			11
12	3 41	3 48	3 55	4 2	4 9	4 16	4 24	4 31	4 38	4 44	4 50	4 56	5 1	5 5			12
13	3 31	3 38	3 44	3 50	3 59	4 4	4 10	4 17	4 23	4 29	4 35	4 40	4 45				13
14	3 23	3 29	3 35	3 41	3 47	3 53	3 59	4 6	4 12	4 17	4 22	4 26	4 30				14
15	3 16	3 21	3 27	3 33	3 38	3 44	3 50	3 56	4 1	4 6	4 10	4 14					15
16	3 10	3 15	3 21	3 26	3 31	3 37	3 42	3 47	3 52	3 57	4 1	4 4					16
17	3 6	3 11	3 16	3 20	3 25	3 30	3 35	3 40	3 45	3 49	3 53						17
18	3 3	3 7	3 12	3 16	3 20	3 25	3 29	3 34	3 38	3 42	3 46						18
19	3 0	3 4	3 8	3 12	3 16	3 20	3 24	3 28	3 32	3 35							19
20	2 57	3 1	3 5	3 8	3 12	3 16	3 20	3 23	3 26	3 29							20
21	2 55	2 58	3 2	3 5	3 9	3 12	3 16	3 19	3 22								21
22	2 53	2 56	3 0	3 3	3 6	3 9	3 12	3 15	3 18								22
23	2 52	2 55	2 58	3 1	3 3	3 6	3 9	3 12									23
24	2 51	2 53	2 56	2 59	3 1	3 4	3 7	3 9									24
25	2 50	2 52	2 54	2 57	2 59	3 1	3 4										25
26	2 49	2 51	2 53	2 55	2 57	2 59	3 1										26
27	2 48	2 50	2 53	2 54	2 56	2 57											27
28	2 47	2 49	2 51	2 53	2 55	2 56											28
29	2 47	2 48	2 50	2 52	2 54												29
30	2 47	2 48	2 49	2 51	2 53												30
31	2 47	2 48	2 49	2 50													31
32	2 47	2 48	2 49	2 50													32
33	2 47	2 48	2 49														33
34	2 48	2 48	2 49														34
35	2 48	2 48															35
36	2 49	2 48															36
37	2 49																37
38	2 50																38
39																	39
40																	40
41																	41
42																	42
43																	43
44																	44
45																	45
46																	46
47																	47
48																	48
49																	49
50																	50
51																	
52																	
53																	
54																	
55																	
56																	
57																	
58																	
59																	
60																	
61																	
62																	
63																	
64																	
65																	
	32°	34°	36°	38°	40°	42°	44°	46°	48°	50°	52°						

TABLE *P*. EFFECT OF SUN's PAR

To be subtracted from the third Correction.

☽'s App Alt	Sun's Apparent Altitude.									
	5	10	20	30	40	50	60	65	80	90
	″	″	″	″	″	″	″	″	″	″
5	1	2	2	3	3	4	4	4		
10	2	2	3	4	4	5	5			
15	3	3	4	4	5	5				
20	4	4	4	5	6	6				
25	4	5	5	6	6					
30	5	5	6	7	7					
35	6	6	7	7						
40	7	7	7	8						
45	7	7	8							
50	8	8	8							
55	8	9								
60	9	9	[illegible]							
65	9									

TABLE XVIII.

THIRD CORRECTION, to APPARENT DISTANCE 116°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	13°	14°	15°	16°	18°	20°	22°	24°	26°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	2 50	2 52	2 55	2 59	3 4	3 10	3 17	3 25	3 33	3 41	3 49	4 5	4 22	4 39	4 56	5 13	6
7	2 52	2 50	2 52	2 55	2 58	3 2	3 8	3 13	3 19	3 25	3 32	3 46	4 0	4 14	4 28	4 42	7
8	2 56	2 52	2 50	2 52	2 54	2 57	3 1	3 5	3 10	3 15	3 21	3 32	3 44	3 56	4 8	4 20	8
9	3 1	2 55	2 52	2 50	2 52	2 54	2 57	3 0	3 4	3 8	3 13	3 21	3 31	3 42	3 53	4 4	9
10	3 7	2 59	2 55	2 52	2 51	2 52	2 54	2 57	3 0	3 3	3 7	3 14	3 22	3 31	3 41	3 50	10
11	3 13	3 4	2 58	2 54	2 52	2 51	2 53	2 55	2 57	3 0	3 3	3 9	3 16	3 23	3 31	3 39	11
12	3 20	3 9	3 2	2 57	2 54	2 53	2 52	2 53	2 55	2 57	3 0	3 5	3 10	3 16	3 23	3 30	12
13	3 27	3 15	3 6	3 1	2 57	2 55	2 53	2 52	2 53	2 55	2 58	3 2	3 6	3 11	3 17	3 23	13
14	3 35	3 21	3 11	3 5	3 0	2 57	2 55	2 53	2 52	2 54	2 56	2 59	3 3	3 7	3 12	3 18	14
15	3 43	3 27	3 16	3 9	3 4	3 0	2 57	2 55	2 53	2 53	2 54	2 57	3 0	3 4	3 8	3 14	15
16	3 51	3 33	3 21	3 13	3 7	3 3	3 0	2 57	2 55	2 54	2 53	2 55	2 58	3 1	3 5	3 10	16
17	3 59	3 40	3 27	3 17	3 11	3 6	3 2	2 59	2 57	2 55	2 54	2 55	2 57	2 59	3 3	3 7	17
18	4 7	3 47	3 33	3 22	3 14	3 9	3 5	3 1	2 59	2 56	2 55	2 54	2 56	2 58	3 1	3 5	18
19	4 16	3 54	3 39	3 27	3 18	3 12	3 8	3 4	3 1	2 58	2 56	2 55	2 55	2 57	3 0	3 3	19
20	4 24	4 1	3 45	3 32	3 22	3 16	3 11	3 7	3 3	3 0	2 58	2 56	2 55	2 57	2 59	3 2	20
21	4 33	4 8	3 51	3 37	3 27	3 20	3 14	3 9	3 5	3 2	3 0	2 57	2 56	2 57	2 59	3 1	21
22	4 41	4 15	3 57	3 43	3 32	3 24	3 17	3 12	3 7	3 4	3 2	2 59	2 57	2 56	2 58	3 0	22
23	4 49	4 22	4 4	3 49	3 37	3 28	3 21	3 15	3 10	3 7	3 4	3 0	2 58	2 57	2 58	3 0	23
24	4 58	4 29	4 10	3 54	3 42	3 32	3 24	3 18	3 13	3 10	3 7	3 2	2 59	2 58	2 57	2 59	24
25	5 6	4 36	4 16	4 0	3 47	3 37	3 28	3 21	3 16	3 12	3 9	3 4	3 1	2 59	2 58	2 59	25
26	5 15	4 43	4 22	4 5	3 52	3 41	3 32	3 24	3 18	3 14	3 11	3 6	3 2	3 0	2 59	2 58	26
27	5 23	4 50	4 28	4 11	3 57	3 45	3 35	3 27	3 21	3 16	3 13	3 8	3 4	3 2	3 0	2 59	27
28	5 31	4 57	4 34	4 16	4 1	3 49	3 39	3 31	3 24	3 19	3 15	3 9	3 5	3 3	3 1	2 59	28
29	5 39	5 4	4 40	4 21	4 6	3 54	3 43	3 34	3 27	3 21	3 17	3 11	3 7	3 4	3 2	3 0	29
30	5 47	5 11	4 46	4 26	4 10	3 58	3 47	3 38	3 30	3 24	3 19	3 13	3 8	3 5	3 3	3 1	30
31	5 55	5 18	4 52	4 32	4 15	4 2	3 51	3 42	3 34	3 27	3 22	3 15	3 10	3 6	3 4	3 2	31
32	6 3	5 26	4 58	4 37	4 20	4 6	3 55	3 45	3 37	3 30	3 25	3 17	3 12	3 8	3 5	3 3	32
33	6 12	5 33	5 5	4 42	4 25	4 11	3 59	3 48	3 40	3 33	3 27	3 19	3 13	3 9	3 6	3 4	33
34	6 20	5 40	5 11	4 47	4 30	4 15	4 2	3 52	3 43	3 36	3 30	3 21	3 15	3 10	3 7	3 5	34
35	6 29	5 47	5 17	4 53	4 35	4 20	4 6	3 55	3 47	3 40	3 33	3 24	3 17	3 12	3 9	3 6	35
36	6 37	5 55	5 23	4 58	4 40	4 24	4 10	3 59	3 50	3 43	3 36	3 26	3 19	3 14	3 10	3 7	36
37	6 45	6 2	5 29	5 4	4 45	4 29	4 14	4 2	3 53	3 46	3 39	3 29	3 21	3 15	3 11	3 8	37
38	6 53	6 9	5 35	5 9	4 50	4 33	4 18	4 6	3 57	3 49	3 42	3 31	3 23	3 17	3 13	3 9	38
39	7 1	6 16	5 41	5 15	4 54	4 37	4 22	4 10	4 0	3 52	3 45	3 33	3 25	3 19	3 15		39
40	7 8	6 23	5 47	5 20	4 58	4 41	4 26	4 13	4 3	3 54	3 47	3 36	3 27	3 20	3 16		40
41	7 15	6 29	5 53	5 25	5 3	4 45	4 30	4 17	4 6	3 57	3 50	3 39	3 29	3 21			41
42	7 22	6 35	5 58	5 30	5 7	4 49	4 33	4 20	4 9	4 0	3 53	3 41	3 31	3 23			42
43	7 30	6 41	6 4	5 35	5 12	4 53	4 37	4 23	4 12	4 3	3 55	3 43	3 33				43
44	7 37	6 47	6 9	5 40	5 16	4 57	4 41	4 27	4 15	4 6	3 58	3 45	3 34				44
45	7 45	6 53	6 15	5 45	5 21	5 1	4 44	4 30	4 18	4 9	4 1	3 47					45
46	7 52	6 59	6 20	5 49	5 25	5 5	4 48	4 33	4 21	4 11	4 3	3 49					46
47	7 59	7 5	6 25	5 54	5 29	5 9	4 52	4 37	4 24	4 14	4 6						47
48	8 6	7 10	6 30	5 59	5 33	5 13	4 55	4 40	4 27	4 17	4 8						48
49	8 12	7 15	6 35	6 4	5 37	5 16	4 58	4 43	4 30	4 19							49
50	8 18	7 20	6 40	6 8	5 41	5 20	5 1	4 46	4 33								50
51	8 24	7 26	6 45	6 12	5 45	5 23	5 4	4 49									51
52	8 30	7 31	6 50	6 16	5 49	5 27	5 7										52
53	8 36	7 37	6 55	6 20	5 53	5 30											53
54	8 42	7 42	6 59	6 24	5 56												54
55	8 48	7 47	7 3	6 28													55
56	8 54	7 52	7 7														56
57	8 59	7 57															57
58	9 3																58
59																	59
60																	60
61																	61
62																	62
63																	63
64																	64
65																	65
	6°	7°	8°	9°	10°	11°	12°	13°	14°	15°	16°	18°	20°	22°	24°	26°	

Third Correction to Apparent Distance 116°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	28°	30°	32°	34°	36°	38°	40°	42°	44°	46°	48°	50°	52°	54°	56°	58°	
°	′ ″	′ ′	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	5 30	5 46	6 3	6 19	6 36	6 52	7 7	7 22	7 36	7 51	8 5	8 18	8 30	8 42	8 53	9 3	6
7	4 56	5 10	5 25	5 40	5 55	6 9	6 22	6 34	6 46	6 58	7 9	7 20	7 31	7 42	7 52		7
8	4 33	4 45	4 58	5 11	5 24	5 36	5 47	5 58	6 8	6 18	6 28	6 38	6 48	6 58	7 8		8
9	4 15	4 26	4 37	4 47	4 58	5 8	5 19	5 29	5 39	5 49	5 59	6 8	6 16	6 24			9
10	4 0	4 10	4 20	4 29	4 39	4 48	4 58	5 7	5 16	5 25	5 33	5 41	5 49	5 56			10
11	3 48	3 57	4 6	4 15	4 23	4 32	4 41	4 49	4 57	5 5	5 12	5 19	5 25				11
12	3 38	3 46	3 54	4 2	4 10	4 18	4 26	4 34	4 41	4 48	4 54	5 1	5 7				12
13	3 30	3 37	3 44	3 52	4 0	4 7	4 14	4 21	4 27	4 33	4 39	4 45					13
14	3 24	3 30	3 37	3 44	3 51	3 57	4 4	4 10	4 16	4 21	4 27	4 33					14
15	3 19	3 25	3 31	3 37	3 43	3 49	3 55	4 1	4 6	4 11	4 17						15
16	3 15	3 20	3 26	3 31	3 37	3 42	3 47	3 53	3 58	4 2	4 8						16
17	3 12	3 16	3 21	3 26	3 31	3 36	3 41	3 46	3 51	3 55							17
18	3 9	3 13	3 17	3 22	3 26	3 31	3 36	3 40	3 45	3 49							18
19	3 7	3 10	3 14	3 18	3 22	3 27	3 31	3 35	3 39								19
20	3 5	3 8	3 11	3 15	3 19	3 23	3 27	3 31	3 34								20
21	3 4	3 6	3 9	3 12	3 16	3 20	3 23	3 27									21
22	3 3	3 5	3 7	3 10	3 14	3 17	3 20	3 23									22
23	3 2	3 4	3 6	3 9	3 12	3 15	3 18										23
24	3 1	3 3	3 5	3 8	3 10	3 13	3 16										24
25	3 0	3 2	3 4	3 7	3 9	3 11											25
26	3 0	3 2	3 4	3 6	3 7	3 9											26
27	3 0	3 1	3 3	3 5	3 6												27
28	2 59	3 0	3 2	3 4	3 5												28
29	2 59	3 0	3 1	3 3													29
30	3 0	3 0	3 1	3 3													30
31	3 1	3 0	3 1														31
32	3 2	3 1	3 2														32
33	3 2	3 1															33
34	3 3	3 2															34
35	3 4																35
36	3 5																36
37																	37
38																	38
39																	39
40																	40
41																	41
42																	42
43																	43
44																	44
45																	45
46																	46
47																	47
48																	48
49																	49
50																	50
51																	
52																	
53																	
54																	
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56																	
57																	
58																	
59																	
60																	
61																	
62																	
63																	
64																	
65																	
	28°	30°	32°	34°	36°	38°	40°	42°	44°	46°	48°						

TABLE *P*. EFFECT OF SUN's PAR

To be subtracted from the third Correction.

☽'s App Alt	Sun's Apparent Altitude.								
	5	10	20	30	40	50	60	70		90
	″	″	″	″	″	″	″	″	″	″
5	2	2	2	3	4	4	5			
10	2	2	3	4	5	5				
15	3	3	4	5	5	6				
20	4	4	5	6	6					
25	5	5	6	6	7					
30	5	6	6	7						
35	6	6	7	8						
40	7	7	8							
45	7	8	[illegible]							
50	8	8								
55	9	9								
60	9									

TABLE XVIII.

THIRD CORRECTION to APPARENT DISTANCE 120°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	6°	7°	8°	9°	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	22°	
°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	°
6	3 1	3 3	3 6	3 11	3 17	3 24	3 32	3 39	3 47	3 55	4 4	4 12	4 21	4 30	4 39	4 57	6
7	3 3	3 2	3 4	3 7	3 11	3 16	3 22	3 28	3 34	3 40	3 47	3 54	4 1	4 8	4 15	4 30	7
8	3 7	3 4	3 3	3 5	3 8	3 11	3 15	3 20	3 25	3 29	3 35	3 40	3 46	3 52	3 59	4 12	8
9	3 12	3 8	3 5	3 4	3 6	3 8	3 11	3 14	3 18	3 22	3 26	3 31	3 36	3 41	3 47	3 58	9
10	3 18	3 12	3 8	3 6	3 5	3 6	3 8	3 10	3 14	3 17	3 20	3 24	3 28	3 33	3 38	3 47	10
11	3 25	3 17	3 12	3 8	3 6	3 5	3 6	3 8	3 11	3 13	3 16	3 19	3 22	3 26	3 30	3 38	11
12	3 33	3 23	3 16	3 11	3 8	3 6	3 5	3 7	3 9	3 11	3 13	3 15	3 18	3 21	3 24	3 31	12
13	3 41	3 28	3 20	3 15	3 11	3 8	3 6	3 6	3 8	3 9	3 11	3 13	3 15	3 17	3 20	3 26	13
14	3 49	3 34	3 25	3 19	3 14	3 11	3 8	3 7	3 7	3 8	3 9	3 11	3 12	3 14	3 17	3 22	14
15	3 57	3 41	3 30	3 23	3 18	3 14	3 11	3 9	3 8	3 7	3 8	3 9	3 11	3 12	3 14	3 18	15
16	4 6	3 48	3 36	3 28	3 22	3 17	3 13	3 11	3 9	3 8	3 8	3 9	3 10	3 11	3 12	3 16	16
17	4 14	3 55	3 42	3 32	3 25	3 20	3 15	3 12	3 10	3 9	3 9	3 9	3 9	3 10	3 11	3 14	17
18	4 23	4 3	3 48	3 37	3 29	3 23	3 18	3 14	3 12	3 11	3 10	3 9	3 9	3 10	3 11	3 13	18
19	4 32	4 10	3 54	3 42	3 33	3 26	3 21	3 17	3 15	3 13	3 11	3 10	3 10	3 9	3 10	3 12	19
20	4 40	4 17	4 1	3 48	3 38	3 30	3 24	3 20	3 17	3 15	3 13	3 12	3 11	3 10	3 10	3 12	20
21	4 49	4 24	4 7	3 53	3 42	3 34	3 28	3 23	3 19	3 17	3 15	3 13	3 12	3 11	3 10	3 11	21
22	4 58	4 31	4 14	3 58	3 47	3 39	3 32	3 26	3 22	3 19	3 16	3 14	3 13	3 12	3 11	3 11	22
23	5 7	4 39	4 21	4 4	3 52	3 43	3 36	3 30	3 25	3 21	3 18	3 16	3 14	3 13	3 12	3 12	23
24	5 16	4 46	4 27	4 10	3 57	3 47	3 39	3 33	3 28	3 23	3 20	3 18	3 16	3 15	3 14	3 13	24
25	5 25	4 53	4 33	4 15	4 2	3 51	3 43	3 36	3 31	3 26	3 23	3 20	3 18	3 17	3 15	3 14	25
26	5 34	5 1	4 40	4 20	4 7	3 56	3 47	3 39	3 34	3 29	3 25	3 22	3 20	3 18	3 16	3 15	26
27	5 42	5 8	4 47	4 25	4 12	4 1	3 51	3 43	3 37	3 32	3 28	3 25	3 22	3 20	3 18	3 16	27
28	5 51	5 16	4 53	4 31	4 17	4 5	3 55	3 47	3 40	3 35	3 30	3 27	3 24	3 22	3 20	3 17	28
29	6 0	5 24	5 0	4 37	4 22	4 10	3 59	3 50	3 43	3 37	3 33	3 29	3 26	3 23	3 21	3 18	29
30	6 8	5 31	5 6	4 43	4 27	4 15	4 3	3 54	3 46	3 40	3 36	3 32	3 28	3 25	3 23	3 19	30
31	6 17	5 39	5 12	4 48	4 32	4 19	4 7	3 57	3 49	3 43	3 38	3 34	3 30	3 27	3 25	3 20	31
32	6 25	5 46	5 18	4 54	4 37	4 23	4 11	4 1	3 52	3 46	3 41	3 36	3 32	3 29	3 27	3 22	32
33	6 34	5 54	5 25	5 0	4 42	4 27	4 15	4 5	3 56	3 49	3 44	3 39	3 35	3 32	3 29	3 24	33
34	6 43	6 2	5 31	5 6	4 47	4 32	4 19	4 9	3 59	3 52	3 47	3 42	3 37	3 34	3 31	3 26	34
35	6 51	6 9	5 38	5 12	4 52	4 37	4 24	4 12	4 2	3 55	3 50	3 45	3 40	3 36	3 33	3 28	35
36	6 59	6 16	5 44	5 18	4 57	4 42	4 28	4 15	4 5	3 58	3 53	3 47	3 42	3 38	3 35	3 30	36
37	7 8	6 23	5 50	5 23	5 2	4 46	4 32	4 19	4 9	4 2	3 56	3 50	3 45	3 41	3 37	3 31	37
38	7 16	6 30	5 56	5 28	5 7	4 50	4 36	4 23	4 13	4 5	3 59	3 53	3 47	3 43	3 39	3 33	38
39	7 24	6 37	6 2	5 34	5 12	4 55	4 40	4 27	4 16	4 8	4 1	3 55	3 50	3 45	3 41		39
40	7 32	6 44	6 8	5 39	5 17	4 59	4 44	4 31	4 20	4 11	4 4	3 58	3 52	3 47	3 43		40
41	7 40	6 50	6 14	5 44	5 22	5 4	4 48	4 35	4 24	4 15	4 7	4 1	3 55	3 49			41
42	7 47	6 56	6 19	5 50	5 27	5 8	4 52	4 39	4 28	4 18	4 10	4 3	3 57				42
43	7 55	7 2	6 25	5 55	5 32	5 13	4 56	4 42	4 31	4 21	4 13	4 6					43
44	8 3	7 9	6 31	6 0	5 37	5 17	5 0	4 46	4 34	4 24	4 16						44
45	8 11	7 15	6 36	6 5	5 42	5 22	5 4	4 49	4 37	4 27							45
46	8 18	7 21	6 41	6 10	5 46	5 26	5 8	4 53	4 40								46
47	8 25	7 27	6 46	6 15	5 51	5 30	5 11	4 56									47
48	8 32	7 33	6 52	6 20	5 55	5 34	5 14										48
49	8 39	7 39	6 57	6 25	5 59	5 37											49
50	8 45	7 45	7 2	6 30	6 3												50
51	8 51	7 51	7 8	6 34													
52	8 57	7 57	7 13														
53	9 3	8 3															
54	9 9																
55																	
56																	
57																	
58																	
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62																	
63																	
64																	
65																	
	6°	7°	8°	9°	10°	11°	12°	13°	14°	15°	16°						

TABLE *P*. EFFECT OF SUN's PAR.

To be subtracted from the third Correction.

☽'s App. Alt.	Sun's Apparent Altitude.									
	5	10	20	30	40	50	55	70	80	90
	″	″	″	″	″	″	″	″	″	″
5	2	2	3	3	4	5	5			
10	2	3	3	4	5	6				
15	3	4	4	5	6	7				
20	4	4	5	6	7					
25	5	5	6	7	7					
30	6	6	7	8						
35	6	7	8							
40	7	8	8							
45	8	8								
50	8	9								
55	9									

TABLE XVIII.

Third Correction, to Apparent Distance 120°.

☽'s App Alt.	APPARENT ALTITUDE OF THE SUN, OR STAR.																☽'s App Alt.
	24°	26°	28°	30°	32°	34°	36°	38°	40°	42°	44°	46°	48°	50°	52°	54°	
°	' "	' "	' "	' "	' "	' "	' "	' "	' "	' "	' "	' "	' "	' "	' "	' "	°
6	5 15	5 32	5 49	6 6	6 23	6 41	6 58	7 14	7 30	7 46	8 2	8 17	8 31	8 44	8 57	9 9	6
7	4 45	5 0	5 15	5 30	5 45	6 0	6 15	6 29	6 43	6 56	7 8	7 21	7 33	7 45	7 57		7
8	4 25	4 38	4 51	5 4	5 17	5 30	5 43	5 56	6 8	6 20	6 31	6 42	6 53	7 3	7 13		8
9	4 9	4 20	4 31	4 43	4 55	5 7	5 18	5 28	5 38	5 49	6 0	6 10	6 20	6 29			9
10	3 57	4 7	4 17	4 27	4 37	4 47	4 57	5 7	5 17	5 27	5 37	5 46	5 55	6 3			10
11	3 47	3 56	4 5	4 14	4 23	4 32	4 42	4 51	4 59	5 8	5 17	5 25	5 33				11
12	3 39	3 47	3 55	4 3	4 11	4 19	4 28	4 37	4 44	4 52	5 0	5 7	5 14				12
13	3 32	3 39	3 46	3 53	4 0	4 8	4 16	4 24	4 31	4 38	4 46	4 53					13
14	3 27	3 33	3 39	3 46	3 52	3 59	4 6	4 13	4 20	4 27	4 34	4 40					14
15	3 23	3 29	3 34	3 40	3 46	3 52	3 58	4 4	4 11	4 18	4 24						15
16	3 20	3 25	3 30	3 36	3 41	3 46	3 52	3 58	4 4	4 10	4 16						16
17	3 18	3 22	3 27	3 32	3 36	3 41	3 47	3 52	3 58	4 3							17
18	3 16	3 20	3 24	3 28	3 32	3 37	3 42	3 47	3 52	3 57							18
19	3 15	3 18	3 21	3 25	3 29	3 33	3 38	3 43	3 47								19
20	3 14	3 16	3 19	3 23	3 27	3 31	3 35	3 39	3 43								20
21	3 13	3 15	3 17	3 21	3 24	3 28	3 32	3 36									21
22	3 12	3 14	3 16	3 19	3 22	3 26	3 29	3 33									22
23	3 12	3 13	3 15	3 18	3 21	3 24	3 27										23
24	3 12	3 13	3 15	3 17	3 20	3 23	3 26										24
25	3 12	3 13	3 15	3 17	3 19	3 21											25
26	3 13	3 14	3 15	3 16	3 18	3 20											26
27	3 14	3 14	3 15	3 16	3 18												27
28	3 15	3 14	3 15	3 16	3 18												28
29	3 16	3 15	3 15	3 16													29
30	3 17	3 16	3 16	3 16													30
31	3 18	3 17	3 17														31
32	3 19	3 18	3 18														32
33	3 21	3 19															33
34	3 22	3 20															34
35	3 24																35
36	3 26																36
37																	37
38																	38
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62																	62
63																	63
64																	64
65																	65
	24°	26°	28°	30°	32°	34°	36°	38°	40°	42°	44°	46°	48°	50°	52°	54°	

TABLE XIX.

Proportional Logarithms.

″ s.	° ′ h. m. 0 0	° ′ h. m. 0 1	° ′ h. m. 0 2	° ′ h. m. 0 3	° ′ h. m. 0 4	° ′ h. m. 0 5	° ′ h. m. 0 6	° ′ h. m. 0 7	° ′ h. m. 0 8	° ′ h. m. 0 9	″ s.
0		2.2553	1.9542	1.7782	1.6532	1.5563	1.4771	1.4102	1.3522	1.3010	0
1	4.0334	2.2481	1.9506	1.7757	1.6514	1.5549	1.4759	1.4091	1.3513	1.3002	1
2	3.7324	2.2410	1.9471	1.7734	1.6496	1.5534	1.4747	1.4081	1.3504	1.2994	2
3	3.5563	2.2341	1.9435	1.7710	1.6478	1.5520	1.4735	1.4071	1.3495	1.2986	3
4	3.4314	2.2272	1.9400	1.7686	1.6460	1.5506	1.4723	1.4061	1.3486	1.2978	4
5	3.3345	2.2205	1.9365	1.7663	1.6443	1.5491	1.4711	1.4050	1.3477	1.2970	5
6	3.2553	2.2139	1.9331	1.7639	1.6425	1.5477	1.4699	1.4940	1.3468	1.2962	6
7	3.1883	2.2073	1.9296	1.7616	1.6407	1.5463	1.4688	1.4030	1.3459	1.2954	7
8	3.1303	2.2009	1.9262	1.7593	1.6390	1.5449	1.4676	1.4020	1.3450	1.2946	8
9	3.0792	2.1946	1.9228	1.7570	1.6372	1.5435	1.4664	1.4010	1.3441	1.2939	9
10	3.0334	2.1883	1.9195	1.7547	1.6355	1.5421	1.4652	1.4000	1.3432	1.2931	10
11	2.9920	2.1822	1.9162	1.7524	1.6338	1.5407	1.4640	1.3989	1.3423	1.2923	11
12	2.9542	2.1761	1.9128	1.7501	1.6320	1.5393	1.4629	1.3979	1.3415	1.2915	12
13	2.9195	2.1701	1.9096	1.7479	1.6303	1.5379	1.4617	1.3969	1.3406	1.2907	13
14	2.8873	2.1642	1.9063	1.7456	1.6286	1.5365	1.4606	1.3959	1.3397	1.2899	14
15	2.8573	2.1584	1.9031	1.7434	1.6269	1.5351	1.4594	1.3949	1.3388	1.2891	15
16	2.8293	2.1526	1.8999	1.7412	1.6252	1.5337	1.4582	1.3939	1.3379	1.2883	16
17	2.8030	2.1469	1.8967	1.7390	1.6235	1.5324	1.4571	1.3929	1.3371	1.2876	17
18	2.7782	2.1413	1.8935	1.7368	1.6218	1.5310	1.4559	1.3919	1.3362	1.2868	18
19	2.7547	2.1358	1.8904	1.7346	1.6201	1.5296	1.4548	1.3910	1.3353	1.2860	19
20	2.7324	2.1303	1.8873	1.7324	1.6185	1.5283	1.4536	1.3900	1.3345	1.2852	20
21	2.7112	2.1249	1.8842	1.7302	1.6168	1.5269	1.4525	1.3890	1.3336	1.2845	21
22	2.6910	2.1196	1.8811	1.7281	1.6151	1.5256	1.4514	1.3880	1.3327	1.2837	22
23	2.6717	2.1143	1.8781	1.7259	1.6135	1.5242	1.4502	1.3870	1.3319	1.2829	23
24	2.6532	2.1091	1.8751	1.7238	1.6118	1.5229	1.4491	1.3860	1.3310	1.2821	24
25	2.6355	2.1040	1.8721	1.7217	1.6102	1.5215	1.4480	1.3851	1.3301	1.2814	25
26	2.6185	2.0989	1.8691	1.7196	1.6085	1.5202	1.4468	1.3841	1.3293	1.2806	26
27	2.6021	2.0939	1.8661	1.7175	1.6069	1.5189	1.4457	1.3831	1.3284	1.2798	27
28	2.5863	2.0889	1.8632	1.7154	1.6053	1.5175	1.4446	1.3821	1.3276	1.2791	28
29	2.5710	2.0840	1.8602	1.7133	1.6037	1.5162	1.4435	1.3812	1.3267	1.2783	29
30	2.5563	2.0792	1.8573	1.7112	1.6021	1.5149	1.4424	1.3802	1.3259	1.2775	30
31	2.5421	2.0744	1.8544	1.7091	1.6005	1.5136	1.4412	1.3792	1.3250	1.2768	31
32	2.5283	2.0696	1.8516	1.7071	1.5989	1.5123	1.4401	1.3783	1.3242	1.2760	32
33	2.5149	2.0649	1.8487	1.7050	1.5973	1.5110	1.4390	1.3773	1.3233	1.2753	33
34	2.5019	2.0603	1.8459	1.7030	1.5957	1.5097	1.4379	1.3764	1.3225	1.2745	34
35	2.4894	2.0557	1.8431	1.7010	1.5941	1.5084	1.4368	1.3754	1.3216	1.2738	35
36	2.4771	2.0512	1.8403	1.6990	1.5925	1.5071	1.4357	1.3745	1.3208	1.2730	36
37	2.4652	2.0467	1.8375	1.6970	1.5909	1.5058	1.4346	1.3735	1.3199	1.2722	37
38	2.4536	2.0422	1.8348	1.6950	1.5894	1.5045	1.4335	1.3726	1.3191	1.2715	38
39	2.4424	2.0378	1.8320	1.6930	1.5878	1.5032	1.4325	1.3716	1.3183	1.2707	39
40	2.4314	2.0334	1.8293	1.6910	1.5863	1.5019	1.4314	1.3707	1.3174	1.2700	40
41	2.4206	2.0291	1.8266	1.6890	1.5847	1.5007	1.4303	1.3697	1.3166	1.2692	41
42	2.4102	2.0248	1.8239	1.6871	1.5832	1.4994	1.4292	1.3688	1.3158	1.2685	42
43	2.4000	2.0206	1.8212	1.6851	1.5816	1.4981	1.4281	1.3678	1.3149	1.2678	43
44	2.3900	2.0164	1.8186	1.6832	1.5801	1.4969	1.4270	1.3669	1.3141	1.2670	44
45	2.3802	2.0122	1.8159	1.6812	1.5786	1.4956	1.4260	1.3660	1.3133	1.2663	45
46	2.3707	2.0081	1.8133	1.6793	1.5771	1.4943	1.4249	1.3650	1.3124	1.2655	46
47	2.3613	2.0040	1.8107	1.6774	1.5755	1.4931	1.4238	1.3641	1.3116	1.2648	47
48	2.3522	2.0000	1.8081	1.6755	1.5740	1.4918	1.4228	1.3632	1.3108	1.2640	48
49	2.3432	1.9960	1.8055	1.6736	1.5725	1.4906	1.4217	1.3623	1.3100	1.2633	49
50	2.3345	1.9920	1.8030	1.6717	1.5710	1.4894	1.4206	1.3613	1.3091	1.2626	50
51	2.3259	1.9881	1.8004	1.6698	1.5695	1.4881	1.4196	1.3604	1.3083	1.2618	51
52	2.3174	1.9842	1.7979	1.6679	1.5680	1.4869	1.4185	1.3595	1.3075	1.2611	52
53	2.3091	1.9803	1.7954	1.6661	1.5666	1.4856	1.4175	1.3586	1.3067	1.2604	53
54	2.3010	1.9765	1.7929	1.6642	1.5651	1.4844	1.4164	1.3576	1.3059	1.2596	54
55	2.2931	1.9727	1.7904	1.6624	1.5636	1.4832	1.4154	1.3567	1.3051	1.2589	55
56	2.2852	1.9690	1.7879	1.6605	1.5621	1.4820	1.4143	1.3558	1.3043	1.2582	56
57	2.2775	1.9652	1.7855	1.6587	1.5607	1.4808	1.4133	1.3549	1.3034	1.2574	57
58	2.2700	1.9615	1.7830	1.6568	1.5592	1.4795	1.4122	1.3540	1.3026	1.2567	58
59	2.2626	1.9579	1.7806	1.6550	1.5578	1.4783	1.4112	1.3531	1.3018	1.2560	59
	0 0	0 1	0 2	0 3	0 4	0 5	0 6	0 7	0 8	0 9	

TABLE XIX

PROPORTIONAL LOGARITHMS.

″ s.	° ′ h. m. 0 10	° ′ h. m. 0 11	° ′ h. m. 0 12	° ′ h. m. 0 13	° ′ h. m. 0 14	° ′ h. m. 0 15	° ′ h. m. 0 16	° ′ h. m. 0 17	° ′ h. m. 0 18	° ′ h. m. 0 19	″ s.
0	1.2553	1.2139	1.1761	1.1413	1.1091	1.0792	1.0512	1.0248	1.0000	0.9765	0
1	1.2545	1.2132	1.1755	1.1408	1.1086	1.0787	1.0507	1.0244	0.9996	0.9761	1
2	1.2538	1.2126	1.1749	1.1402	1.1081	1.0782	1.0502	1.0240	0.9992	0.9758	2
3	1.2531	1.2119	1.1743	1.1397	1.1076	1.0777	1.0498	1.0235	0.9988	0.9754	3
4	1.2524	1.2113	1.1737	1.1391	1.1071	1.0773	1.0493	1.0231	0.9984	0.9750	4
5	1.2517	1.2106	1.1731	1.1386	1.1066	1.0768	1.0489	1.0227	0.9980	0.9746	5
6	1.2510	1.2099	1.1725	1.1380	1.1061	1.0763	1.0484	1.0223	0.9976	0.9742	6
7	1.2502	1.2093	1.1719	1.1374	1.1055	1.0758	1.0480	1.0219	0.9972	0.9739	7
8	1.2495	1.2086	1.1713	1.1369	1.1050	1.0753	1.0475	1.0214	0.9968	0.9735	8
9	1.2488	1.2080	1.1707	1.1363	1.1045	1.0749	1.0471	1.0210	0.9964	0.9731	9
10	1.2481	1.2073	1.1701	1.1358	1.1040	1.0744	1.0467	1.0206	0.9960	0.9727	10
11	1.2474	1.2067	1.1695	1.1352	1.1035	1.0739	1.0462	1.0202	0.9956	0.9723	11
12	1.2467	1.2061	1.1689	1.1347	1.1030	1.0734	1.0458	1.0197	0.9952	0.9720	12
13	1.2460	1.2054	1.1683	1.1342	1.1025	1.0730	1.0453	1.0193	0.9948	0.9716	13
14	1.2453	1.2048	1.1677	1.1336	1.1020	1.0725	1.0449	1.0189	0.9944	0.9712	14
15	1.2445	1.2041	1.1671	1.1331	1.1015	1.0720	1.0444	1.0185	0.9940	0.9708	15
16	1.2438	1.2035	1.1665	1.1325	1.1009	1.0715	1.0440	1.0181	0.9936	0.9705	16
17	1.2431	1.2028	1.1660	1.1320	1.1004	1.0711	1.0435	1.0176	0.9932	0.9701	17
18	1.2424	1.2022	1.1654	1.1314	1.0999	1.0706	1.0431	1.0172	0.9928	0.9697	18
19	1.2417	1.2016	1.1648	1.1309	1.0994	1.0701	1.0426	1.0168	0.9924	0.9693	19
20	1.2410	1.2009	1.1642	1.1303	1.0989	1.0696	1.0422	1.0164	0.9920	0.9690	20
21	1.2403	1.2003	1.1636	1.1298	1.0984	1.0692	1.0418	1.0160	0.9916	0.9686	21
22	1.2396	1.1996	1.1630	1.1292	1.0979	1.0687	1.0413	1.0156	0.9912	0.9682	22
23	1.2389	1.1990	1.1624	1.1287	1.0974	1.0682	1.0409	1.0151	0.9908	0.9678	23
24	1.2382	1.1984	1.1619	1.1282	1.0969	1.0678	1.0404	1.0147	0.9905	0.9675	24
25	1.2375	1.1977	1.1613	1.1276	1.0964	1.0673	1.0400	1.0143	0.9901	0.9671	25
26	1.2368	1.1971	1.1607	1.1271	1.0959	1.0668	1.0395	1.0139	0.9897	0.9667	26
27	1.2362	1.1965	1.1601	1.1266	1.0954	1.0663	1.0391	1.0135	0.9893	0.9664	27
28	1.2355	1.1958	1.1595	1.1260	1.0949	1.0659	1.0387	1.0131	0.9889	0.9660	28
29	1.2348	1.1952	1.1589	1.1255	1.0944	1.0654	1.0382	1.0126	0.9885	0.9656	29
30	1.2341	1.1946	1.1584	1.1249	1.0939	1.0649	1.0378	1.0122	0.9881	0.9652	30
31	1.2334	1.1939	1.1578	1.1244	1.0934	1.0645	1.0374	1.0118	0.9877	0.9649	31
32	1.2327	1.1933	1.1572	1.1239	1.0929	1.0640	1.0369	1.0114	0.9873	0.9645	32
33	1.2320	1.1927	1.1566	1.1233	1.0924	1.0635	1.0365	1.0110	0.9869	0.9641	33
34	1.2313	1.1921	1.1561	1.1228	1.0919	1.0631	1.0360	1.0106	0.9865	0.9638	34
35	1.2307	1.1914	1.1555	1.1223	1.0914	1.0626	1.0356	1.0102	0.9861	0.9634	35
36	1.2300	1.1908	1.1549	1.1217	1.0909	1.0621	1.0352	1.0098	0.9858	0.9630	36
37	1.2293	1.1902	1.1543	1.1212	1.0904	1.0617	1.0347	1.0093	0.9854	0.9626	37
38	1.2286	1.1896	1.1538	1.1207	1.0899	1.0612	1.0343	1.0089	0.9850	0.9623	38
39	1.2279	1.1889	1.1532	1.1201	1.0894	1.0608	1.0339	1.0085	0.9846	0.9619	39
40	1.2272	1.1883	1.1526	1.1196	1.0889	1.0603	1.0334	1.0081	0.9842	0.9615	40
41	1.2266	1.1877	1.1520	1.1191	1.0884	1.0599	1.0330	1.0077	0.9838	0.9612	41
42	1.2259	1.1871	1.1515	1.1186	1.0880	1.0594	1.0326	1.0073	0.9834	0.9608	42
43	1.2252	1.1865	1.1509	1.1180	1.0875	1.0589	1.0321	1.0069	0.9830	0.9604	43
44	1.2245	1.1859	1.1503	1.1175	1.0870	1.0585	1.0317	1.0065	0.9827	0.9601	44
45	1.2239	1.1852	1.1498	1.1170	1.0865	1.0580	1.0313	1.0061	0.9823	0.9597	45
46	1.2232	1.1846	1.1492	1.1164	1.0860	1.0575	1.0308	1.0057	0.9819	0.9593	46
47	1.2225	1.1840	1.1486	1.1159	1.0855	1.0571	1.0304	1.0053	0.9815	0.9590	47
48	1.2218	1.1834	1.1481	1.1154	1.0850	1.0566	1.0300	1.0049	0.9811	0.9586	48
49	1.2212	1.1828	1.1475	1.1149	1.0845	1.0562	1.0295	1.0044	0.9807	0.9582	49
50	1.2205	1.1822	1.1469	1.1143	1.0840	1.0557	1.0291	1.0040	0.9803	0.9579	50
51	1.2198	1.1816	1.1464	1.1138	1.0835	1.0552	1.0287	1.0036	0.9800	0.9575	51
52	1.2192	1.1809	1.1458	1.1133	1.0831	1.0548	1.0282	1.0032	0.9796	0.9571	52
53	1.2185	1.1803	1.1452	1.1128	1.0826	1.0543	1.0278	1.0028	0.9792	0.9568	53
54	1.2178	1.1797	1.1447	1.1123	1.0821	1.0539	1.0274	1.0024	0.9788	0.9564	54
55	1.2172	1.1791	1.1441	1.1117	1.0816	1.0534	1.0270	1.0020	0.9784	0.9561	55
56	1.2165	1.1785	1.1436	1.1112	1.0811	1.0530	1.0265	1.0016	0.9781	0.9557	56
57	1.2159	1.1779	1.1430	1.1107	1.0806	1.0525	1.0261	1.0012	0.9777	0.9553	57
58	1.2152	1.1773	1.1424	1.1102	1.0801	1.0521	1.0257	1.0008	0.9773	0.9550	58
59	1.2145	1.1767	1.1419	1.1097	1.0797	1.0516	1.0252	1.0004	0.9769	0.9546	59
	0 10	0 11	0 12	0 13	0 14	0 15	0 16	0 17	0 18	0 19	

TABLE XIX.

Proportional Logarithms.

″	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	″
s.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	s.
	0 20	0 21	0 22	0 23	0 24	0 25	0 26	0 27	0 28	0 29	0 30	0 31	
0	0.9542	9331	9128	8935	8751	8573	8403	8239	8081	7929	7782	7639	0
1	9539	9327	9125	8932	8748	8570	8400	8236	8079	7926	7779	7637	1
2	9535	9324	9122	8929	8745	8568	8397	8234	8076	7924	7777	7634	2
3	9532	9320	9119	8926	8742	8565	8395	8231	8073	7921	7774	7632	3
4	9528	9317	9115	8923	8739	8562	8392	8228	8071	7919	7772	7630	4
5	0.9524	9313	9112	8920	8736	8559	8389	8226	8068	7916	7769	7627	5
6	9521	9310	9109	8917	8733	8556	8386	8223	8066	7914	7767	7625	6
7	9517	9306	9106	8913	8730	8553	8384	8220	8063	7911	7765	7623	7
8	9514	9303	9102	8910	8727	8550	8381	8218	8061	7909	7762	7620	8
9	9510	9300	9099	8907	8724	8547	8378	8215	8058	7906	7760	7618	9
10	0.9506	9296	9096	8904	8721	8544	8375	8212	8055	7904	7757	7616	10
11	9503	9293	9092	8901	8718	8542	8372	8210	8053	7901	7755	7613	11
12	9499	9289	9089	8898	8715	8539	8370	8207	8050	7899	7753	7611	12
13	9496	9286	9086	8895	8712	8536	8367	8204	8048	7896	7750	7609	13
14	9492	9283	9083	8892	8709	8533	8364	8202	8045	7894	7748	7607	14
15	0.9488	9279	9079	8888	8706	8530	8361	8199	8043	7891	7745	7604	15
16	9485	9276	9076	8885	8703	8527	8359	8196	8040	7889	7743	7602	16
17	9481	9272	9073	8882	8700	8524	8356	8194	8037	7887	7741	7600	17
18	9478	9269	9070	8879	8697	8522	8353	8191	8035	7884	7738	7597	18
19	9474	9266	9066	8876	8694	8519	8350	8188	8032	7882	7736	7595	19
20	0.9471	9262	9063	8873	8691	8516	8348	8186	8030	7879	7734	7593	20
21	9467	9259	9060	8870	8688	8513	8345	8183	8027	7877	7731	7590	21
22	9464	9255	9057	8867	8685	8510	8342	8181	8025	7874	7729	7588	22
23	9460	9252	9053	8864	8682	8507	8339	8178	8022	7872	7726	7586	23
24	9456	9249	9050	8861	8679	8504	8337	8175	8020	7869	7724	7583	24
25	0.9453	9245	9047	8857	8676	8502	8334	8173	8017	7867	7722	7581	25
26	9449	9242	9044	8854	8673	8499	8331	8170	8014	7864	7719	7579	26
27	9446	9238	9041	8851	8670	8496	8328	8167	8012	7862	7717	7577	27
28	9442	9235	9037	8848	8667	8493	8326	8165	8009	7859	7714	7574	28
29	9439	9232	9034	8845	8664	8490	8323	8162	8007	7857	7712	7572	29
30	0.9435	9228	9031	8842	8661	8487	8320	8159	8004	7855	7710	7570	30
31	9432	9225	9028	8839	8658	8484	8318	8157	8002	7852	7707	7567	31
32	9428	9222	9024	8836	8655	8482	8315	8154	7999	7850	7705	7565	32
33	9425	9218	9021	8833	8652	8479	8312	8152	7997	7847	7703	7563	33
34	9421	9215	9018	8830	8649	8476	8309	8149	7994	7845	7700	7560	34
35	0.9418	9212	9015	8827	8646	8473	8307	8146	7992	7842	7698	7558	35
36	9414	9208	9012	8824	8643	8470	8304	8144	7989	7840	7696	7556	36
37	9411	9205	9008	8821	8640	8467	8301	8141	7987	7837	7693	7554	37
38	9407	9201	9005	8817	8637	8465	8298	8138	7984	7835	7691	7551	38
39	9404	9198	9002	8814	8635	8462	8296	8136	7981	7832	7688	7549	39
40	0.9400	9195	8999	8811	8632	8459	8293	8133	7979	7830	7686	7547	40
41	9397	9191	8996	8808	8629	8456	8290	8131	7976	7828	7684	7544	41
42	9393	9188	8992	8805	8626	8453	8288	8128	7974	7825	7681	7542	42
43	9390	9185	8989	8802	8623	8451	8285	8125	7971	7823	7679	7540	43
44	9386	9181	8986	8799	8620	8448	8282	8123	7969	7820	7677	7538	44
45	0.9383	9178	8983	8796	8617	8445	8279	8120	7966	7818	7674	7535	45
46	9379	9175	8980	8793	8614	8442	8277	8117	7964	7815	7672	7533	46
47	9376	9172	8977	8790	8611	8439	8274	8115	7961	7813	7670	7531	47
48	9372	9168	8973	8787	8608	8437	8271	8112	7959	7811	7667	7528	48
49	9369	9165	8970	8784	8605	8434	8269	8110	7956	7808	7665	7526	49
50	0.9365	9162	8967	8781	8602	8431	8266	8107	7954	7806	7663	7524	50
51	9362	9158	8964	8778	8599	8428	8263	8104	7951	7803	7660	7522	51
52	9358	9155	8961	8775	8597	8425	8261	8102	7949	7801	7658	7519	52
53	9355	9152	8958	8772	8594	8423	8258	8099	7946	7798	7655	7517	53
54	9351	9148	8954	8769	8591	8420	8255	8097	7944	7796	7653	7515	54
55	0.9348	9145	8951	8766	8588	8417	8253	8094	7941	7794	7651	7513	55
56	9344	9142	8948	8763	8585	8414	8250	8091	7939	7791	7648	7510	56
57	9341	9138	8945	8760	8582	8411	8247	8089	7936	7789	7646	7508	57
58	9337	9135	8942	8757	8579	8409	8244	8086	7934	7786	7644	7506	58
59	9334	9132	8939	8754	8576	8406	8242	8084	7931	7784	7641	7503	59
	0 20	0 21	0 22	0 23	0 24	0 25	0 26	0 27	0 28	0 29	0 30	0 31	

TABLE XIX.

PROPORTIONAL LOGARITHMS.

″ s.	° ′ h. m. 0 32	° ′ h. m. 0 33	° ′ h. m. 0 34	° ′ h. m. 0 35	° ′ h. m. 0 36	° ′ h. m. 0 37	° ′ h. m. 0 38	° ′ h. m. 0 39	° ′ h. m. 0 40	° ′ h. m. 0 41	° ′ h. m. 0 42	° ′ h. m. 0 43	″ s.
0	0.7501	7368	7238	7112	6990	6871	6755	6642	6532	6425	6320	6218	0
1	7499	7365	7236	7110	6988	6869	6753	6640	6530	6423	6319	6216	1
2	7497	7363	7234	7108	6986	6867	6751	6638	6529	6421	6317	6215	2
3	7494	7361	7232	7106	6984	6865	6749	6637	6527	6420	6315	6213	3
4	7492	7359	7229	7104	6982	6863	6747	6635	6525	6418	6313	6211	4
5	0.7490	7357	7227	7102	6980	6861	6745	6633	6523	6416	6312	6210	5
6	7488	7354	7225	7100	6978	6859	6743	6631	6521	6414	6310	6208	6
7	7485	7352	7223	7098	6976	6857	6742	6629	6519	6413	6308	6206	7
8	7483	7350	7221	7096	6974	6855	6740	6627	6518	6411	6306	6205	8
9	7481	7348	7219	7093	6972	6853	6738	6625	6516	6409	6305	6203	9
10	0.7479	7346	7217	7091	6970	6851	6736	6624	6514	6407	6303	6201	10
11	7476	7344	7215	7089	6968	6849	6734	6622	6512	6406	6301	6200	11
12	7474	7341	7212	7087	6966	6847	6732	6620	6510	6404	6300	6198	12
13	7472	7339	7210	7085	6964	6845	6730	6618	6509	6402	6298	6196	13
14	7470	7337	7208	7083	6962	6843	6728	6616	6507	6400	6296	6195	14
15	0.7467	7335	7206	7081	6960	6841	6726	6614	6505	6398	6294	6193	15
16	7465	7333	7204	7079	6958	6840	6725	6612	6503	6397	6293	6191	16
17	7463	7330	7202	7077	6956	6838	6723	6611	6501	6395	6291	6190	17
18	7461	7328	7200	7075	6954	6836	6721	6609	6500	6393	6289	6188	18
19	7458	7326	7198	7073	6952	6834	6719	6607	6498	6391	6288	6186	19
20	0.7456	7324	7196	7071	6950	6832	6717	6605	6496	6390	6286	6185	20
21	7454	7322	7193	7069	6948	6830	6715	6603	6494	6388	6284	6183	21
22	7452	7320	7191	7067	6946	6828	6713	6601	6492	6386	6282	6181	22
23	7450	7317	7189	7065	6944	6826	6711	6600	6491	6384	6281	6179	23
24	7447	7315	7187	7063	6942	6824	6709	6598	6489	6383	6279	6178	24
25	0.7445	7313	7185	7061	6940	6822	6708	6596	6487	6381	6277	6176	25
26	7443	7311	7183	7059	6938	6820	6706	6594	6485	6379	6276	6174	26
27	7441	7309	7181	7057	6936	6818	6704	6592	6484	6377	6274	6173	27
28	7438	7307	7179	7055	6934	6816	6702	6590	6482	6376	6272	6171	28
29	7436	7304	7177	7052	6932	6814	6700	6589	6480	6374	6271	6169	29
30	0.7434	7302	7175	7050	6930	6812	6698	6587	6478	6372	6269	6168	30
31	7432	7300	7172	7048	6928	6810	6696	6585	6476	6371	6267	6166	31
32	7429	7298	7170	7046	6926	6809	6694	6583	6475	6369	6265	6165	32
33	7427	7296	7168	7044	6924	6807	6692	6581	6473	6367	6264	6163	33
34	7425	7294	7166	7042	6922	6805	6691	6579	6471	6365	6262	6161	34
35	0.7423	7291	7164	7040	6920	6803	6689	6578	6469	6364	6260	6160	35
36	7421	7289	7162	7038	6918	6801	6687	6576	6467	6362	6259	6158	36
37	7418	7287	7160	7036	6916	6799	6685	6574	6466	6360	6257	6156	37
38	7416	7285	7158	7034	6914	6797	6683	6572	6464	6358	6255	6155	38
39	7414	7283	7156	7032	6912	6795	6681	6570	6462	6357	6254	6153	39
40	0.7412	7281	7154	7030	6910	6793	6679	6568	6460	6355	6252	6151	40
41	7409	7279	7152	7028	6908	6791	6677	6567	6459	6353	6250	6150	41
42	7407	7276	7149	7026	6906	6789	6676	6565	6457	6351	6248	6148	42
43	7405	7274	7147	7024	6904	6787	6674	6563	6455	6350	6247	6146	43
44	7403	7272	7145	7022	6902	6785	6672	6561	6453	6348	6245	6145	44
45	0.7401	7270	7143	7020	6900	6784	6670	6559	6451	6346	6243	6143	45
46	7398	7268	7141	7018	6898	6782	6668	6558	6450	6344	6242	6141	46
47	7396	7266	7139	7016	6896	6780	6666	6556	6448	6343	6240	6140	47
48	7394	7264	7137	7014	6894	6778	6664	6554	6446	6341	6238	6138	48
49	7392	7261	7135	7012	6892	6776	6663	6552	6444	6339	6237	6136	49
50	0.7390	7259	7133	7010	6890	6774	6661	6550	6443	6338	6235	6135	50
51	7387	7257	7131	7008	6888	6772	6659	6548	6441	6336	6233	6133	51
52	7385	7255	7129	7006	6886	6770	6657	6547	6439	6334	6232	6131	52
53	7383	7253	7127	7004	6884	6768	6655	6545	6437	6332	6230	6130	53
54	7381	7251	7124	7002	6882	6766	6653	6543	6435	6331	6228	6128	54
55	0.7379	7249	7122	7000	6881	6764	6651	6541	6434	6329	6226	6126	55
56	7376	7246	7120	6998	6879	6763	6650	6539	6432	6327	6225	6125	56
57	7374	7244	7118	6996	6877	6761	6648	6538	6430	6325	6223	6123	57
58	7372	7242	7116	6994	6875	6759	6646	6536	6428	6324	6221	6121	58
59	7370	7240	7114	6992	6873	6757	6644	6534	6427	6322	6220	6120	59
	0 32	0 33	0 34	0 35	0 36	0 37	0 38	0 39	0 40	0 41	0 42	0 43	

TABLE XIX.

PROPORTIONAL LOGARITHMS.

″ s.	° ′ h. m. 0 44	° ′ h. m. 0 45	° ′ h. m. 0 46	° ′ h. m. 0 47	° ′ h. m. 0 48	° ′ h. m. 0 49	° ′ h. m. 0 50	° ′ h. m. 0 51	° ′ h. m. 0 52	° ′ h. m. 0 53	° ′ h. m. 0 54	° ′ h. m. 0 55	″ s.
0	0.6118	6021	5925	5832	5740	5651	5563	5477	5393	5310	5229	5149	0
1	6117	6019	5924	5830	5739	5649	5562	5476	5391	5309	5227	5148	1
2	6115	6017	5922	5829	5737	5648	5560	5474	5390	5307	5226	5146	2
3	6113	6016	5920	5827	5736	5646	5559	5473	5389	5306	5225	5145	3
4	6112	6014	5919	5826	5734	5645	5557	5471	5387	5305	5223	5144	4
5	0.6110	6013	5917	5824	5733	5643	5556	5470	5386	5303	5222	5143	5
6	6108	6011	5916	5823	5731	5642	5554	5469	5384	5302	5221	5141	6
7	6107	6009	5914	5821	5730	5640	5553	5467	5383	5300	5219	5140	7
8	6105	6908	5913	5819	5728	5639	5551	5466	5382	5299	5218	5139	8
9	6103	6006	5911	5818	5727	5637	5550	5464	5380	5298	5217	5137	9
10	0.6102	6005	5909	5816	5725	5636	5549	5463	5379	5296	5215	5136	10
11	6100	6003	5908	5815	5724	5635	5547	5461	5377	5295	5214	5135	11
12	6099	6001	5906	5813	5722	5633	5546	5460	5376	5294	5213	5133	12
13	6097	6000	5905	5812	5721	5632	5544	5459	5375	5292	5211	5132	13
14	6095	5998	5903	5810	5719	5630	5543	5457	5373	5291	5210	5131	14
15	0.6094	5997	5902	5809	5718	5629	5541	5456	5372	5290	5209	5129	15
16	6092	5995	5900	5807	5716	5627	5540	5454	5370	5288	5207	5128	16
17	6090	5993	5898	5806	5715	5626	5538	5453	5369	5287	5206	5127	17
18	6089	5992	5897	5804	5713	5624	5537	5452	5368	5285	5205	5125	18
19	6087	5990	5895	5803	5712	5623	5536	5450	5366	5284	5203	5124	19
20	0.6085	5989	5894	5801	5710	5621	5534	5449	5365	5283	5202	5123	20
21	6084	5987	5892	5800	5709	5620	5533	5447	5364	5281	5201	5122	21
22	6082	5985	5891	5798	5707	5618	5531	5446	5362	5280	5199	5120	22
23	6081	5984	5889	5796	5706	5617	5530	5445	5361	5279	5198	5119	23
24	6079	5982	5888	5795	5704	5615	5528	5443	5359	5277	5197	5118	24
25	0.6077	5981	5886	5793	5703	5614	5527	5442	5358	5276	5195	5116	25
26	6076	5979	5884	5792	5701	5613	5526	5440	5357	5275	5194	5115	26
27	6074	5977	5883	5790	5700	5611	5524	5439	5355	5273	5193	5114	27
28	6072	5976	5881	5789	5698	5610	5522	5437	5354	5272	5191	5112	28
29	6071	5974	5880	5787	5697	5608	5521	5436	5353	5271	5190	5111	29
30	0.6069	5973	5878	5786	5695	5607	5520	5435	5351	5269	5189	5110	30
31	6067	5971	5877	5784	5694	5605	5518	5433	5350	5268	5187	5108	31
32	6066	5969	5875	5783	5692	5604	5517	5432	5348	5266	5186	5107	32
33	6064	5968	5874	5781	5691	5602	5516	5430	5347	5265	5185	5106	33
34	6063	5966	5872	5780	5689	5601	5514	5429	5346	5264	5183	5105	34
35	0.6061	5965	5870	5778	5688	5599	5513	5428	5344	5262	5182	5103	35
36	6059	5963	5869	5777	5686	5598	5511	5426	5343	5261	5181	5102	36
37	6058	5961	5867	5775	5685	5596	5510	5425	5341	5260	5179	5101	37
38	6056	5960	5866	5774	5683	5595	5508	5423	5340	5258	5178	5099	38
39	6055	5958	5864	5772	5682	5594	5507	5422	5339	5257	5177	5098	39
40	0.6053	5957	5863	5771	5680	5592	5506	5421	5337	5256	5175	5097	40
41	6051	5955	5861	5769	5679	5591	5504	5419	5336	5254	5174	5095	41
42	6050	5954	5860	5768	5677	5589	5503	5418	5335	5253	5173	5094	42
43	6048	5952	5858	5766	5676	5588	5501	5416	5333	5252	5172	5093	43
44	6046	5950	5856	5765	5674	5586	5500	5415	5332	5250	5170	5092	44
45	0.6045	5949	5855	5763	5673	5585	5498	5414	5331	5249	5169	5090	45
46	6043	5947	5853	5761	5671	5583	5497	5412	5329	5248	5168	5089	46
47	6042	5946	5852	5760	5670	5582	5496	5411	5328	5246	5166	5088	47
48	6040	5944	5850	5758	5669	5580	5494	5409	5326	5245	5165	5086	48
49	6038	5942	5849	5757	5667	5579	5493	5408	5325	5244	5164	5085	49
50	0.6037	5941	5847	5755	5666	5578	5491	5407	5324	5242	5162	5084	50
51	6035	5939	5846	5754	5664	5576	5490	5405	5322	5241	5161	5082	51
52	6033	5938	5844	5752	5663	5575	5488	5404	5321	5240	5160	5081	52
53	6032	5936	5843	5751	5661	5573	5487	5402	5320	5238	5158	5080	53
54	6030	5935	5841	5749	5660	5572	5486	5401	5318	5237	5157	5079	54
55	0.6029	5933	5839	5748	5658	5570	5484	5400	5317	5235	5156	5077	55
56	6027	5931	5838	5746	5657	5569	5483	5398	5315	5234	5154	5076	56
57	6025	5930	5836	5745	5655	5567	5481	5397	5314	5233	5153	5075	57
58	6024	5928	5835	5743	5654	5566	5480	5395	5313	5231	5152	5073	58
59	6022	5927	5833	5742	5652	5564	5478	5394	5311	5230	5150	5072	59
	0 44	0 45	0 46	0 47	0 48	0 49	0 50	0 51	0 52	0 53	0 54	0 55	

TABLE XIX

PROPORTIONAL LOGARITHMS.

″ s.	° ′ h. m 0 56	° ′ h. m. 0 57	° ′ h. m. 0 58	° ′ h. m. 0 59	° ′ h. m. 1 0	° ′ h. m. 1 1	° ′ h. m. 1 2	° ′ h. m. 1 3	° ′ h. m. 1 4	° ′ h. m. 1 5	° ′ h. m. 1 6	° ′ h. m. 1 7	″ s.
0	0.5071	4994	4918	4844	4771	4699	4629	4559	4491	4424	4357	4292	0
1	5070	4993	4917	4843	4770	4698	4628	4558	4490	4422	4356	4291	1
2	5068	4991	4916	4842	4769	4697	4626	4557	4489	4421	4355	4290	2
3	5067	4990	4915	4841	4768	4696	4625	4556	4488	4420	4354	4289	3
4	5066	4989	4913	4839	4766	4695	4624	4555	4486	4419	4353	4288	4
5	0.5064	4988	4912	4838	4765	4693	4623	4554	4485	4418	4352	4287	5
6	5063	4986	4911	4837	4764	4692	4622	4552	4484	4417	4351	4285	6
7	5062	4985	4910	4836	4763	4691	4621	4551	4483	4416	4350	4284	7
8	5061	4984	4908	4834	4762	4690	4619	4550	4482	4415	4349	4283	8
9	5059	4983	4907	4833	4760	4689	4618	4549	4481	4414	4347	4282	9
10	0.5058	4981	4906	4832	4759	4688	4617	4548	4480	4412	4346	4281	10
11	5057	4980	4905	4831	4758	4686	4616	4547	4479	4411	4345	4280	11
12	5055	4979	4903	4830	4757	4685	4615	4546	4477	4410	4344	4279	12
13	5054	4977	4902	4828	4756	4684	4614	4544	4476	4409	4343	4278	13
14	5053	4976	4901	4827	4754	4683	4612	4543	4475	4408	4342	4277	14
15	0.5051	4975	4900	4826	4753	4682	4611	4542	4474	4407	4341	4276	15
16	5050	4974	4899	4825	4752	4680	4610	4541	4473	4406	4340	4275	16
17	5049	4972	4897	4823	4751	4679	4609	4540	4472	4405	4339	4274	17
18	5048	4971	4896	4822	4750	4678	4608	4539	4471	4404	4338	4273	18
19	5046	4970	4895	4821	4748	4677	4607	4538	4469	4402	4336	4271	19
20	0.5045	4969	4894	4820	4747	4676	4606	4536	4468	4401	4335	4270	20
21	5044	4967	4892	4819	4746	4675	4604	4535	4467	4400	4334	4269	21
22	5043	4966	4891	4817	4745	4673	4603	4534	4466	4399	4333	4268	22
23	5041	4965	4890	4816	4744	4672	4602	4533	4465	4398	4332	4267	23
24	5040	4964	4889	4815	4742	4671	4601	4532	4464	4397	4331	4266	24
25	0.5038	4962	4887	4814	4741	4670	4600	4531	4463	4396	4330	4265	25
26	5037	4961	4886	4812	4740	4669	4599	4530	4462	4395	4329	4264	26
27	5036	4960	4885	4811	4739	4668	4597	4528	4460	4394	4328	4263	27
28	5035	4959	4884	4810	4738	4666	4596	4527	4459	4393	4327	4262	28
29	5034	4957	4882	4809	4736	4665	4595	4526	4458	4391	4326	4261	29
30	0.5032	4956	4881	4808	4735	4664	4594	4525	4457	4390	4325	4260	30
31	5031	4955	4880	4806	4734	4663	4593	4524	4456	4389	4323	4259	31
32	5030	4954	4879	4805	4733	4662	4592	4523	4455	4388	4322	4258	32
33	5028	4952	4877	4804	4732	4660	4590	4522	4454	4387	4321	4256	33
34	5027	4951	4876	4803	4730	4659	4589	4520	4453	4386	4320	4255	34
35	0.5026	4950	4875	4801	4729	4658	4588	4519	4452	4385	4319	4254	35
36	5025	4949	4874	4800	4728	4657	4587	4518	4450	4384	4318	4253	36
37	5023	4947	4873	4799	4727	4656	4586	4517	4449	4383	4317	4252	37
38	5022	4946	4871	4798	4726	4655	4585	4516	4448	4381	4316	4251	38
39	5021	4945	4870	4797	4724	4653	4584	4515	4447	4380	4315	4250	39
40	0.5019	4943	4869	4795	4723	4652	4582	4514	4446	4379	4314	4249	40
41	5018	4942	4868	4794	4722	4651	4581	4512	4445	4378	4313	4248	41
42	5017	4941	4866	4793	4721	4650	4580	4511	4444	4377	4311	4247	42
43	5016	4940	4865	4792	4720	4649	4579	4510	4443	4376	4310	4246	43
44	5014	4938	4864	4791	4718	4648	4578	4509	4441	4375	4309	4245	44
45	0.5013	4937	4863	4789	4717	4647	4577	4508	4440	4374	4308	4244	45
46	5012	4936	4861	4788	4716	4645	4575	4507	4439	4373	4307	4243	46
47	5011	4935	4860	4787	4715	4644	4574	4506	4438	4372	4306	4241	47
48	5009	4933	4859	4786	4714	4643	4573	4505	4437	4370	4305	4240	48
49	5008	4932	4858	4785	4712	4642	4572	4503	4436	4369	4304	4239	49
50	0.5007	4931	4856	4783	4711	4640	4571	4502	4435	4368	4303	4238	50
51	5005	4930	4855	4782	4710	4639	4570	4501	4134	4367	4302	4237	51
52	5004	4928	4854	4781	4709	4638	4569	4500	4433	4366	4301	4236	52
53	5003	4927	4853	4780	4708	4637	4567	4499	4431	4365	4300	4235	53
54	5002	4926	4852	4778	4707	4636	4566	4498	4430	4364	4299	4234	54
55	0.5000	4925	4850	4777	4705	4635	4565	4497	4429	4363	4297	4233	55
56	4999	4923	4849	4776	4704	4633	4564	4495	4428	4362	4296	4232	56
57	4998	4922	4848	4775	4703	4632	4563	4494	4427	4361	4295	4231	57
58	4997	4921	4847	4774	4702	4631	4562	4493	4426	4359	4294	4230	58
59	4995	4920	4845	4772	4701	4630	4560	4492	4425	4358	4293	4229	59
	0 56	0 57	0 58	0 59	1 0	1 1	1 2	1 3	1 4	1 5	1 6	1 7	

TABLE XIX.

PROPORTIONAL LOGARITHMS.

″ s.	° ′ h. m. 1 8	° ′ h. m. 1 9	° ′ h. m. 1 10	° ′ h. m. 1 11	° ′ h. m. 1 12	° ′ h. m. 1 13	° ′ h. m. 1 14	° ′ h. m. 1 15	° ′ h. m. 1 16	° ′ h. m. 1 17	° ′ h. m. 1 18	° ′ h. m. 1 19	″ s.
0	0.4228	4164	4102	4040	3979	3919	3860	3802	3745	3688	3632	3576	0
1	4227	4163	4101	4039	3978	3919	3859	3801	3744	3687	3631	3576	1
2	4226	4162	4100	4038	3977	3918	3858	3800	3743	3686	3630	3575	2
3	4224	4161	4099	4037	3976	3917	3857	3799	3742	3685	3629	3574	3
4	4223	4160	4098	4036	3975	3916	3856	3798	3741	3684	3628	3573	4
5	0.4222	4159	4097	4035	3974	3915	3856	3797	3740	3683	3627	3572	5
6	4221	4158	4096	4034	3973	3914	3855	3796	3739	3682	3626	3571	6
7	4220	4157	4095	4033	3972	3913	3854	3795	3738	3681	3625	3570	7
8	4219	4156	4093	4032	3971	3912	3853	3794	3737	3680	3624	3569	8
9	4218	4155	4092	4031	3970	3911	3852	3793	3736	3679	3623	3568	9
10	0.4217	4154	4091	4030	3969	3910	3851	3792	3735	3678	3623	3567	10
11	4216	4153	4090	4029	3968	3909	3850	3792	3734	3677	3622	3566	11
12	4215	4152	4089	4028	3967	3908	3849	3791	3733	3677	3621	3565	12
13	4214	4151	4088	4027	3966	3907	3848	3790	3732	3676	3620	3565	13
14	4213	4150	4087	4026	3965	3906	3847	3789	3731	3675	3619	3564	14
15	0.4212	4149	4086	4025	3964	3905	3846	3788	3730	3674	3618	3563	15
16	4211	4147	4085	4024	3963	3904	3845	3787	3729	3673	3617	3562	16
17	4210	4146	4084	4023	3962	3903	3844	3786	3728	3672	3616	3561	17
18	4209	4145	4083	4022	3961	3902	3843	3785	3727	3671	3615	3560	18
19	4207	4144	4082	4021	3960	3901	3842	3784	3727	3670	3614	3559	19
20	0.4206	4143	4081	4020	3959	3900	3841	3783	3726	3669	3613	3558	20
21	4205	4142	4080	4019	3958	3899	3840	3782	3725	3668	3612	3557	21
22	4204	4141	4079	4018	3957	3898	3839	3781	3724	3667	3611	3556	22
23	4203	4140	4078	4017	3956	3897	3838	3780	3723	3666	3610	3555	23
24	4202	4139	4077	4016	3955	3896	3837	3779	3722	3665	3610	3555	24
25	0.4201	4138	4076	4015	3954	3895	3836	3778	3721	3664	3609	3554	25
26	4200	4137	4075	4014	3953	3894	3835	3777	3720	3663	3608	3553	26
27	4199	4136	4074	4013	3952	3893	3834	3776	3719	3663	3607	3552	27
28	4198	4135	4073	4012	3951	3892	3833	3775	3718	3662	3606	3551	28
29	4197	4134	4072	4011	3950	3891	3832	3774	3717	3661	3605	3550	29
30	0.4196	4133	4071	4010	3949	3890	3831	3773	3716	3660	3604	3549	30
31	4195	4132	4070	4009	3948	3889	3830	3772	3715	3659	3603	3548	31
32	4194	4131	4069	4008	3947	3888	3829	3771	3714	3658	3602	3547	32
33	4193	4130	4068	4007	3946	3887	3828	3770	3713	3657	3601	3546	33
34	4192	4129	4067	4006	3945	3886	3827	3769	3712	3656	3600	3545	34
35	0.4191	4128	4066	4005	3944	3885	3826	3768	3711	3655	3599	3545	35
36	4189	4127	4065	4004	3943	3884	3825	3768	3710	3654	3598	3544	36
37	4188	4126	4064	4003	3942	3883	3824	3767	3709	3653	3598	3543	37
38	4187	4125	4063	4002	3941	3882	3823	3766	3709	3652	3597	3542	38
39	4186	4124	4062	4001	3940	3881	3822	3765	3708	3651	3596	3541	39
40	0.4185	4122	4061	4000	3939	3880	3821	3764	3707	3650	3595	3540	40
41	4184	4121	4060	3999	3938	3879	3820	3763	3706	3649	3594	3539	41
42	4183	4120	4059	3998	3937	3878	3820	3762	3705	3649	3593	3538	42
43	4182	4119	4058	3997	3936	3877	3819	3761	3704	3648	3592	3537	43
44	4181	4118	4056	3996	3935	3876	3818	3760	3703	3647	3591	3536	44
45	0.4180	4117	4055	3995	3934	3875	3817	3759	3702	3646	3590	3535	45
46	4179	4116	4054	3993	3933	3874	3816	3758	3701	3645	3589	3535	46
47	4178	4115	4053	3992	3932	3873	3815	3757	3700	3644	3588	3534	47
48	4177	4114	4052	3991	3931	3872	3814	3756	3699	3643	3587	3533	48
49	4176	4113	4051	3990	3930	3871	3813	3755	3698	3642	3587	3532	49
50	0.4175	4112	4050	3989	3929	3870	3812	3754	3697	3641	3586	3531	50
51	4174	4111	4049	3988	3928	3869	3811	3753	3696	3640	3585	3530	51
52	4173	4110	4048	3987	3927	3868	3810	3752	3695	3639	3584	3529	52
53	4172	4109	4047	3986	3926	3867	3809	3751	3694	3638	3583	3528	53
54	4171	4108	4046	3985	3925	3866	3808	3750	3693	3637	3582	3527	54
55	0.4169	4107	4045	3984	3924	3865	3807	3749	3693	3636	3581	3526	55
56	4168	4106	4044	3983	3923	3864	3806	3748	3692	3635	3580	3525	56
57	4167	4105	4043	3982	3922	3863	3805	3747	3691	3635	3579	3525	57
58	4166	4104	4042	3981	3921	3862	3804	3746	3690	3634	3578	3524	58
59	4165	4103	4041	3980	3920	3861	3803	3746	3689	3633	3577	3523	59
	1 8	1 9	1 10	1 11	1 12	1 13	1 14	1 15	1 16	1 17	1 18	1 19	

TABLE XIX.

PROPORTIONAL LOGARITHMS.

″ s.	° ′ h. m. 1 20	° ′ h. m. 1 21	° ′ h. m. 1 22	° ′ h. m. 1 23	° ′ h. m. 1 24	° ′ h. m. 1 25	° ′ h. m. 1 26	° ′ h. m. 1 27	° ′ h. m. 1 28	° ′ h. m. 1 29	° ′ h. m. 1 30	° ′ h. m. 1 31	″ s.
0	0.3522	3468	3415	3362	3310	3259	3208	3158	3108	3059	3010	2962	0
1	3521	3467	3414	3361	3309	3258	3207	3157	3107	3058	3009	2962	1
2	3520	3466	3413	3360	3308	3257	3206	3156	3106	3057	3009	2961	2
3	3519	3465	3412	3359	3307	3256	3205	3155	3105	3056	3008	2960	3
4	3518	3464	3411	3358	3306	3255	3204	3154	3105	3056	3007	2959	4
5	0.3517	3463	3410	3358	3306	3254	3204	3153	3104	3055	3006	2958	5
6	3516	3463	3409	3357	3305	3253	3203	3153	3103	3054	3005	2958	6
7	3515	3462	3408	3356	3304	3253	3202	3152	3102	3053	3005	2957	7
8	3514	3461	3408	3355	3303	3252	3201	3151	3101	3052	3004	2956	8
9	3514	3460	3407	3354	3302	3251	3200	3150	3101	3052	3003	2955	9
10	0.3513	3459	3406	3353	3301	3250	3199	3149	3100	3051	3002	2954	10
11	3512	3458	3405	3352	3300	3249	3198	3148	3099	3050	3001	2954	11
12	3511	3457	3404	3351	3300	3248	3198	3148	3098	3049	3001	2953	12
13	3510	3456	3403	3351	3299	3247	3197	3147	3097	3048	3000	2952	13
14	3509	3455	3402	3350	3298	3247	3196	3146	3096	3047	2999	2951	14
15	0.3508	3454	3401	3349	3297	3246	3195	3145	3096	3047	2998	2950	15
16	3507	3454	3400	3348	3296	3245	3194	3144	3095	3046	2997	2950	16
17	3506	3453	3400	3347	3295	3244	3193	3143	3094	3045	2997	2949	17
18	3506	3452	3399	3346	3294	3243	3193	3143	3093	3044	2996	2948	18
19	3505	3451	3398	3345	3294	3242	3192	3142	3092	3043	2995	2947	19
20	0.3504	3450	3397	3345	3293	3242	3191	3141	3091	3043	2994	2946	20
21	3503	3449	3396	3344	3292	3241	3190	3140	3091	3042	2993	2946	21
22	3502	3448	3395	3343	3291	3240	3189	3139	3090	3041	2993	2945	22
23	3501	3447	3394	3342	3290	3239	3188	3138	3089	3040	2992	2944	23
24	3500	3446	3393	3341	3289	3238	3188	3138	3088	3039	2991	2943	24
25	0.3499	3446	3393	3340	3288	3237	3187	3137	3087	3039	2990	2942	25
26	3498	3445	3392	3339	3288	3236	3186	3136	3087	3038	2989	2942	26
27	3497	3444	3391	3338	3287	3236	3185	3135	3086	3037	2989	2941	27
28	3497	3443	3390	3338	3286	3235	3184	3134	3085	3036	2988	2940	28
29	3496	3442	3389	3337	3285	3234	3183	3133	3084	3035	2987	2939	29
30	0.3495	3441	3388	3336	3284	3233	3183	3133	3083	3034	2986	2939	30
31	3494	3440	3387	3335	3283	3232	3182	3132	3082	3034	2985	2938	31
32	3493	3439	3386	3334	3282	3231	3181	3131	3082	3033	2985	2937	32
33	3492	3438	3386	3333	3282	3231	3180	3130	3081	3032	2984	2936	33
34	3491	3438	3385	3332	3281	3230	3179	3129	3080	3031	2983	2935	34
35	0.3490	3437	3384	3332	3280	3229	3178	3129	3079	3030	2982	2935	35
36	3489	3436	3383	3331	3279	3228	3178	3128	3078	3030	2981	2934	36
37	3488	3435	3382	3330	3278	3227	3177	3127	3078	3029	2981	2933	37
38	3488	3434	3381	3329	3277	3226	3176	3126	3077	3028	2980	2932	38
39	3487	3433	3380	3328	3276	3225	3175	3125	3076	3027	2979	2931	39
40	0.3486	3432	3379	3327	3276	3225	3174	3124	3075	3026	2978	2931	40
41	3485	3431	3379	3326	3275	3224	3173	3124	3074	3026	2977	2930	41
42	3484	3431	3378	3325	3274	3223	3173	3123	3073	3025	2977	2929	42
43	3483	3430	3377	3325	3273	3222	3172	3122	3073	3024	2976	2928	43
44	3482	3429	3376	3324	3272	3221	3171	3121	3072	3023	2975	2927	44
45	0.3481	3428	3375	3323	3271	3220	3170	3120	3071	3022	2974	2927	45
46	3480	3427	3374	3322	3270	3220	3169	3119	3070	3022	2973	2926	46
47	3480	3426	3373	3321	3270	3219	3168	3119	3069	3021	2973	2925	47
48	3479	3425	3372	3320	3269	3218	3168	3118	3069	3020	2972	2924	48
49	3478	3424	3372	3319	3268	3217	3167	3117	3068	3019	2971	2924	49
50	0.3477	3423	3371	3319	3267	3216	3166	3116	3067	3018	2970	2923	50
51	3476	3423	3370	3318	3266	3215	3165	3115	3066	3018	2969	2922	51
52	3475	3422	3369	3317	3265	3214	3164	3114	3065	3017	2969	2921	52
53	3474	3421	3368	3316	3265	3214	3163	3114	3065	3016	2968	2920	53
54	3473	3420	3367	3315	3264	3213	3163	3113	3064	3015	2967	2920	54
55	0.3472	3419	3366	3314	3263	3212	3162	3112	3063	3014	2966	2919	55
56	3471	3418	3365	3313	3262	3211	3161	3111	3062	3014	2965	2918	56
57	3471	3417	3365	3313	3261	3210	3160	3110	3061	3013	2965	2917	57
58	3470	3416	3364	3312	3260	3209	3159	3110	3060	3012	2964	2916	58
59	3469	3415	3363	3311	3259	3209	3158	3109	3060	3011	2963	2916	59
	1 20	1 21	1 22	1 23	1 24	1 25	1 26	1 27	1 28	1 29	1 30	1 31	

TABLE XIX

PROPORTIONAL LOGARITHMS.

″ s.	° ′ h. m 1 32	° ′ h. m. 1 33	° ′ h. m 1 34	° ′ h. m. 1 35	° ′ h. m 1 36	° ′ h. m. 1 37	° ′ h. m 1 38	° ′ h. m. 1 39	° ′ h. m. 1 40	° ′ h. m. 1 41	° ′ h. m. 1 42	° ′ h. m. 1 43	″ s.
0	0.2915	2868	2821	2775	2730	2685	2640	2596	2553	2510	2467	2424	0
1	2914	2867	2821	2775	2729	2684	2640	2596	2552	2509	2466	2424	1
2	2913	2866	2820	2774	2729	2684	2639	2595	2551	2508	2465	2423	2
3	2912	2866	2819	2773	2728	2683	2638	2594	2551	2507	2465	2422	3
4	2912	2865	2818	2772	2727	2682	2638	2593	2550	2507	2464	2422	4
5	0.2911	2864	2818	2772	2726	2681	2637	2593	2549	2506	2463	2421	5
6	2910	2863	2817	2771	2725	2681	2636	2592	2548	2505	2462	2420	6
7	2909	2862	2816	2770	2725	2680	2635	2591	2548	2504	2462	2419	7
8	2909	2862	2815	2769	2724	2679	2635	2591	2547	2504	2461	2419	8
9	2908	2861	2815	2769	2723	2678	2634	2590	2546	2503	2460	2418	9
10	0.2907	2860	2814	2768	2722	2678	2633	2589	2545	2502	2460	2417	10
11	2906	2859	2813	2767	2722	2677	2632	2588	2545	2502	2459	2417	11
12	2905	2859	2812	2766	2721	2676	2632	2588	2544	2501	2458	2416	12
13	2905	2858	2811	2766	2720	2675	2631	2587	2543	2500	2458	2415	13
14	2904	2857	2811	2765	2719	2675	2630	2586	2543	2499	2457	2415	14
15	0.2903	2856	2810	2764	2719	2674	2629	2585	2542	2499	2456	2414	15
16	2902	2855	2809	2763	2718	2673	2629	2585	2541	2498	2455	2413	16
17	2901	2855	2808	2763	2717	2672	2628	2584	2540	2497	2455	2412	17
18	2901	2854	2808	2762	2716	2672	2627	2583	2540	2497	2454	2412	18
19	2900	2853	2807	2761	2716	2671	2626	2583	2539	2496	2453	2111	19
20	0.2899	2852	2806	2760	2715	2670	2626	2582	2538	2495	2453	2410	20
21	2898	2852	2805	2760	2714	2669	2525	2581	2538	2494	2452	2410	21
22	2898	2851	2805	2759	2713	2669	2624	2580	2537	2494	2451	2409	22
23	2897	2850	2804	2758	2713	2668	2624	2580	2536	2493	2450	2408	23
24	2896	2849	2803	2757	2712	2667	2623	2579	2535	2492	2450	2408	24
25	0.2895	2848	2802	2756	2711	2666	2622	2578	2535	2492	2449	2407	25
26	2894	2848	2801	2756	2710	2666	2621	2577	2534	2491	2448	2406	26
27	2894	2847	2801	2755	2710	2665	2621	2577	2533	2490	2448	2405	27
28	2893	2846	2800	2754	2709	2664	2620	2576	2533	2489	2447	2405	28
29	2892	2845	2799	2753	2708	2663	2619	2575	2532	2489	2446	2404	29
30	0.2891	2845	2798	2753	2707	2663	2618	2574	2531	2488	2445	2403	30
31	2891	2844	2798	2752	2707	2662	2618	2574	2530	2487	2445	2403	31
32	289	2843	2797	2751	2706	2661	2617	2573	2530	2487	2444	2402	32
33	2889	2842	2796	2750	2705	2660	2616	2572	2529	2486	2443	2401	33
34	2888	2842	2795	2750	2704	2660	2615	2572	2528	2485	2443	2401	34
35	0.2887	2841	2795	2749	2704	2659	2615	2571	2527	2485	2442	2400	35
36	2887	2840	2794	2748	2703	2658	2614	2570	2527	2484	2441	2399	36
37	2886	2839	2793	2747	2702	2657	2613	2569	2526	2483	2441	2398	37
38	2885	2838	2792	2747	2701	2657	2612	2569	2525	2482	2440	2398	38
39	2881	2838	2792	2746	2701	2656	2612	2568	2525	2482	2439	2397	39
40	0.2883	2837	2791	2745	2700	2655	2611	2567	2524	2481	2438	2396	40
41	2883	2836	2790	2744	2699	2655	2610	2566	2523	2480	2438	2396	41
42	2882	2835	2789	2744	2698	2654	2610	2566	2522	2480	2437	2395	42
43	2881	2835	2788	2743	2698	2653	2609	2565	2522	2479	2436	2394	43
44	2880	2834	2788	2742	2697	2652	2608	2564	2521	2478	2436	2394	44
45	0.2880	2833	2787	2741	2696	2652	2607	2564	2520	2477	2435	2393	45
46	2879	2832	2786	2741	2695	2651	2607	2563	2520	2477	2434	2392	46
47	2878	2831	2785	2740	2695	2650	2606	2562	2519	2476	2433	2391	47
48	2877	2831	2785	2739	2694	2649	2605	2561	2518	2475	2433	2391	48
49	2876	2830	2784	2738	2693	2649	2604	2561	2517	2475	2432	2390	49
50	0.2876	2829	2783	2738	2692	2648	2604	2560	2517	2474	2431	2389	50
51	2875	2828	2782	2737	2692	2647	2603	2559	2516	2473	2431	2389	51
52	2874	2827	2782	2736	2691	2646	2602	2559	2515	2472	2430	2388	52
53	2873	2827	2781	2735	2690	2646	2601	2558	2515	2472	2429	2387	53
54	2873	2826	2780	2735	2689	2645	2601	2557	2514	2471	2429	2387	54
55	0.2872	2825	2779	2734	2689	2644	2600	2556	2513	2470	2428	2386	55
56	2871	2825	2779	2733	2688	2643	2599	2556	2512	2470	2427	2385	56
57	2870	2824	2778	2732	2687	2643	2599	2555	2512	2469	2426	2384	57
58	2869	2823	2777	2732	2687	2612	2598	2554	2511	2468	2426	2384	58
59	2869	2822	2776	2731	2686	2641	2597	2553	2510	2467	2425	2383	59
	1 32	1 33	1 34	1 35	1 36	1 37	1 38	1 39	1 40	1 41	1 42	1 43	

TABLE XIX.

Proportional Logarithms.

″ s.	° ′ h. m. 1 44	° ′ h. m. 1 45	° ′ h. m. 1 46	° ′ h. m. 1 47	° ′ h. m. 1 48	° ′ h. m. 1 49	° ′ h. m. 1 50	° ′ h. m. 1 51	° ′ h. m. 1 52	° ′ h. m. 1 53	° ′ h. m. 1 54	° ′ h. m. 1 55	″ s.
0	0.2382	2341	2300	2259	2218	2178	2139	2099	2061	2022	1984	1946	0
1	2382	2340	2299	2258	2218	2178	2138	2099	2060	2021	1983	1945	1
2	2381	2339	2298	2258	2217	2177	2137	2098	2059	2021	1982	1944	2
3	2380	2339	2298	2257	2216	2176	2137	2098	2059	2020	1982	1944	3
4	2380	2338	2297	2256	2216	2176	2136	2097	2058	2019	1981	1943	4
5	0.2379	2337	2296	2256	2215	2175	2136	2096	2057	2019	1981	1943	5
6	2378	2337	2296	2255	2214	2174	2135	2096	2057	2018	1980	1942	6
7	2378	2336	2295	2254	2214	2174	2134	2095	2056	2017	1979	1941	7
8	2377	2335	2294	2253	2213	2173	2134	2094	2055	2017	1979	1941	8
9	2376	2335	2294	2253	2212	2172	2133	2094	2055	2016	1978	1940	9
10	0.2375	2334	2293	2252	2212	2172	2132	2093	2054	2016	1977	1939	10
11	2375	2333	2292	2251	2211	2171	2132	2092	2053	2015	1977	1939	11
12	2374	2333	2291	2251	2210	2170	2131	2092	2053	2014	1976	1938	12
13	2373	2332	2291	2250	2210	2170	2130	2091	2052	2014	1975	1938	13
14	2373	2331	2290	2249	2209	2169	2130	2090	2052	2013	1975	1937	14
15	0.2372	2331	2289	2249	2208	2169	2129	2090	2051	2012	1974	1936	15
16	2371	2330	2289	2248	2208	2168	2128	2089	2050	2012	1974	1936	16
17	2371	2329	2288	2247	2207	2167	2128	2088	2050	2011	1973	1935	17
18	2370	2328	2287	2247	2206	2166	2127	2088	2049	2010	1972	1934	18
19	2369	2328	2287	2246	2206	2166	2126	2087	2048	2010	1972	1934	19
20	0.2368	2327	2286	2245	2205	2165	2126	2086	2048	2009	1971	1933	20
21	2368	2326	2285	2245	2204	2165	2125	2086	2047	2009	1970	1933	21
22	2367	2326	2285	2244	2204	2164	2124	2085	2046	2008	1970	1932	22
23	2366	2325	2284	2243	2203	2163	2124	2085	2046	2007	1969	1931	23
24	2366	2324	2283	2243	2202	2163	2123	2084	2045	2007	1968	1931	24
25	0.2365	2324	2283	2242	2202	2162	2122	2083	2044	2006	1968	1930	25
26	2364	2323	2282	2241	2201	2161	2122	2083	2044	2005	1967	1929	26
27	2364	2322	2281	2241	2200	2161	2121	2082	2043	2005	1967	1929	27
28	2363	2322	2281	2240	2200	2160	2120	2081	2042	2004	1966	1928	28
29	2362	2321	2280	2239	2199	2159	2120	2081	2042	2003	1965	1928	29
30	0.2362	2320	2279	2239	2198	2159	2119	2080	2041	2003	1965	1927	30
31	2361	2320	2279	2238	2198	2158	2118	2079	2041	2002	1964	1926	31
32	2360	2319	2278	2237	2197	2157	2118	2079	2040	2001	1963	1926	32
33	2359	2318	2277	2237	2196	2157	2117	2078	2039	2001	1963	1925	33
34	2359	2317	2277	2236	2196	2156	2116	2077	2039	2000	1962	1924	34
35	0.2358	2317	2276	2235	2195	2155	2116	2077	2038	2000	1962	1924	35
36	2357	2316	2275	2235	2194	2155	2115	2076	2037	1999	1961	1923	36
37	2357	2315	2274	2234	2194	2154	2115	2075	2037	1998	1960	1923	37
38	2356	2315	2274	2233	2193	2153	2114	2073	2036	1998	1960	1922	38
39	2355	2314	2273	2233	2192	2153	2113	2074	2035	1997	1959	1921	39
40	0.2355	2313	2272	2232	2192	2152	2113	2073	2035	1996	1958	1921	40
41	2354	2313	2272	2231	2191	2151	2112	2073	2034	1996	1958	1920	41
42	2353	2312	2271	2231	2190	2151	2111	2072	2033	1995	1957	1919	42
43	2353	2311	2270	2230	2190	2150	2111	2072	2033	1994	1956	1919	43
44	2352	2311	2270	2229	2189	2149	2110	2071	2032	1994	1956	1918	44
45	0.2351	2310	2269	2229	2188	2149	2109	2070	2032	1993	1955	1918	45
46	2350	2309	2268	2228	2188	2148	2109	2070	2031	1993	1955	1917	46
47	2350	2309	2268	2227	2187	2147	2108	2069	2030	1992	1954	1916	47
48	2349	2308	2267	2227	2186	2147	2107	2068	2030	1991	1953	1916	48
49	2348	2307	2266	2226	2186	2146	2107	2068	2029	1991	1953	1915	49
50	0.2348	2307	2266	2225	2185	2145	2106	2067	2028	1990	1952	1914	50
51	2347	2306	2265	2225	2184	2145	2105	2066	2028	1989	1951	1914	51
52	2346	2305	2264	2224	2184	2144	2105	2066	2027	1989	1951	1913	52
53	2346	2304	2264	2223	2183	2143	2104	2065	2026	1988	1950	1913	53
54	2345	2304	2263	2223	2182	2143	2103	2064	2026	1987	1950	1912	54
55	0.2344	2303	2262	2222	2182	2142	2103	2064	2025	1987	1949	1911	55
56	2344	2302	2262	2221	2181	2141	2102	2063	2025	1986	1948	1911	56
57	2343	2302	2261	2220	2180	2141	2101	2062	2024	1986	1948	1910	57
58	2342	2301	2260	2220	2180	2140	2101	2062	2023	1985	1947	1909	58
59	2342	2300	2260	2219	2179	2139	2100	2061	2023	1984	1946	1909	59
	1 44	1 45	1 46	1 47	1 48	1 49	1 50	1 51	1 52	1 53	1 54	1 55	

TABLE XIX.

PROPORTIONAL LOGARITHMS.

″ s.	° ′ h. m 1 56	° ′ h. m. 1 57	° ′ h. m. 1 58	° ′ h. m. 1 59	° ′ h. m 2 0	° ′ h. m. 2 1	° ′ h. m 2 2	° ′ h. m. 2 3	° ′ h. m. 2 4	° ′ h. m. 2 5	° ′ h. m. 2 6	° ′ h. m. 2 7	″ s.
0	0.1908	1871	1834	1797	1761	1725	1689	1654	1619	1584	1549	1515	0
1	1908	1870	1833	1797	1760	1724	1689	1653	1618	1583	1548	1514	1
2	1907	1870	1833	1796	1760	1724	1688	1652	1617	1582	1548	1514	2
3	1906	1869	1832	1795	1759	1723	1687	1652	1617	1582	1547	1513	3
4	1906	1868	1831	1795	1759	1722	1687	1651	1616	1581	1547	1512	4
5	0,1905	1868	1831	1794	1758	1722	1686	1651	1616	1581	1546	1512	5
6	1904	1867	1830	1794	1757	1721	1686	1650	1615	1580	1546	1511	6
7	1904	1867	1830	1793	1757	1721	1685	1650	1614	1580	1545	1511	7
8	1903	1866	1829	1792	1756	1720	1684	1649	1614	1579	1544	1510	8
9	1903	1865	1828	1792	1755	1719	1684	1648	1613	1578	1544	1510	9
10	0.1902	1865	1828	1791	1755	1719	1683	1648	1613	1578	1543	1509	10
11	1901	1864	1827	1791	1754	1718	1683	1647	1612	1577	1543	1508	11
12	1901	1863	1827	1790	1754	1718	1682	1647	1612	1577	1542	1508	12
13	1900	1863	1826	1789	1753	1717	1681	1646	1611	1576	1542	1507	13
14	1899	1862	1825	1789	1752	1717	1681	1645	1610	1576	1541	1507	14
15	0.1899	1862	1825	1788	1752	1716	1680	1645	1610	1575	1540	1506	15
16	1898	1861	1824	1788	1751	1715	1680	1644	1609	1574	1540	1506	16
17	1898	1860	1823	1787	1751	1715	1679	1644	1609	1574	1539	1505	17
18	1897	1860	1823	1786	1750	1714	1678	1643	1608	1573	1539	1504	18
19	1896	1859	1822	1786	1749	1714	1678	1643	1607	1573	1538	1504	19
20	0.1896	1859	1822	1785	1749	1713	1677	1642	1607	1572	1538	1503	20
21	1895	1858	1821	1785	1748	1712	1677	1641	1606	1571	1537	1503	21
22	1894	1857	1820	1784	1748	1712	1676	1641	1606	1571	1536	1502	22
23	1894	1857	1820	1783	1747	1711	1676	1640	1605	1570	1536	1502	23
24	1893	1856	1819	1783	1746	1711	1675	1640	1605	1570	1535	1501	24
25	0.1893	1855	1819	1782	1746	1710	1675	1639	1604	1569	1535	1500	25
26	1892	1855	1818	1781	1745	1709	1674	1638	1603	1569	1534	1500	26
27	1891	1854	1818	1781	1745	1709	1673	1638	1603	1568	1534	1499	27
28	1891	1854	1817	1780	1744	1708	1673	1637	1602	1567	1533	1499	28
29	1890	1853	1816	1780	1743	1708	1672	1637	1602	1567	1532	1498	29
30	0.1889	1852	1816	1779	1743	1707	1671	1636	1601	1566	1532	1498	30
31	1889	1852	1815	1778	1742	1706	1671	1635	1600	1566	1531	1497	31
32	1888	1851	1814	1778	1742	1706	1670	1635	1600	1565	1531	1496	32
33	1888	1850	1814	1777	1741	1705	1670	1634	1599	1565	1530	1496	33
34	1887	1850	1813	1777	1740	1705	1669	1634	1599	1564	1530	1495	34
35	0.1886	1849	1812	1776	1740	1704	1668	1633	1598	1563	1529	1495	35
36	1886	1849	1812	1775	1739	1703	1668	1633	1598	1563	1528	1494	36
37	1885	1848	1811	1775	1739	1703	1667	1632	1597	1562	1528	1494	37
38	1884	1847	1811	1774	1738	1702	1667	1631	1596	1562	1527	1493	38
39	1884	1847	1810	1774	1737	1702	1666	1631	1596	1561	1527	1493	39
40	0.1883	1846	1809	1773	1737	1701	1665	1630	1595	1561	1526	1492	40
41	1883	1846	1809	1772	1736	1700	1665	1630	1595	1560	1526	1491	41
42	1882	1845	1808	1772	1736	1700	1664	1629	1594	1559	1525	1491	42
43	1881	1844	1808	1771	1735	1699	1664	1628	1593	1559	1524	1490	43
44	1881	1844	1807	1771	1734	1699	1663	1628	1593	1558	1524	1490	44
45	0.1880	1843	1806	1770	1734	1698	1663	1627	1592	1558	1523	1489	45
46	1880	1843	1806	1769	1733	1697	1662	1627	1592	1557	1523	1489	46
47	1879	1842	1805	1769	1733	1697	1661	1626	1591	1556	1522	1488	47
48	1878	1841	1805	1768	1732	1696	1661	1626	1591	1556	1522	1487	48
49	1878	1841	1804	1768	1731	1696	1660	1625	1590	1555	1521	1487	49
50	0.1877	1840	1803	1767	1731	1695	1660	1624	1589	1555	1520	1486	50
51	1876	1839	1803	1766	1730	1694	1659	1624	1589	1554	1520	1486	51
52	1876	1839	1802	1766	1730	1694	1658	1623	1588	1554	1519	1485	52
53	1875	1838	1802	1765	1729	1693	1658	1623	1588	1553	1519	1485	53
54	1875	1838	1801	1765	1728	1693	1657	1622	1587	1552	1518	1484	54
55	0.1874	1837	1800	1764	1728	1692	1657	1621	1587	1552	1518	1483	55
56	1873	1836	1800	1763	1727	1692	1656	1621	1586	1551	1517	1483	56
57	1873	1836	1799	1763	1727	1691	1655	1620	1585	1551	1516	1482	57
58	1872	1835	1798	1762	1726	1690	1655	1620	1585	1550	1516	1482	58
59	1871	1835	1798	1762	1725	1690	1654	1619	1584	1550	1515	1481	59
	1 56	1 57	1 58	1 59	2 0	2 1	2 2	2 3	2 4	2 5	2 6	2 7	

TABLE XIX.

Proportional Logarithms.

″ s.	° ′ h. m. 2 8	° ′ h. m. 2 9	° ′ h. m 2 10	° ′ h. m. 2 11	° ′ h. m. 2 12	° ′ h. m. 2 13	° ′ h. m. 2 14	° ′ h. m. 2 15	° ′ h. m. 2 16	° ′ h. m. 2 17	° ′ h. m. 2 18	° ′ h. m. 2 19	° ′ h. m. 2 20	″ s.
0	0.1481	1447	1413	1380	1347	1314	1282	1249	1217	1186	1154	1123	1091	0
1	1480	1446	1413	1379	1346	1314	1281	1249	1217	1185	1153	1122	1091	1
2	1479	1446	1412	1379	1346	1313	1281	1248	1216	1184	1153	1122	1090	2
3	1479	1445	1412	1378	1345	1313	1280	1248	1216	1184	1152	1121	1090	3
4	1478	1445	1411	1378	1345	1312	1280	1247	1215	1183	1152	1120	1089	4
5	0.1478	1444	1411	1377	1344	1311	1279	1247	1215	1183	1151	1120	1089	5
6	1477	1443	1410	1377	1344	1311	1278	1246	1214	1182	1151	1119	1088	6
7	1477	1443	1409	1376	1343	1310	1278	1246	1214	1182	1150	1119	1088	7
8	1476	1442	1409	1376	1343	1310	1277	1245	1213	1181	1150	1118	1087	8
9	1476	1442	1408	1375	1342	1309	1277	1245	1213	1181	1149	1118	1087	9
10	0.1475	1441	1408	1374	1342	1309	1276	1244	1212	1180	1149	1117	1086	10
11	1474	1441	1407	1374	1341	1308	1276	1243	1211	1180	1148	1117	1086	11
12	1474	1440	1407	1373	1340	1308	1275	1243	1211	1179	1148	1116	1085	12
13	1473	1440	1406	1373	1340	1307	1275	1242	1210	1179	1147	1116	1085	13
14	1473	1439	1406	1372	1339	1307	1274	1242	1210	1178	1147	1115	1084	14
15	0.1472	1438	1405	1372	1339	1306	1274	1241	1209	1178	1146	1115	1084	15
16	1472	1438	1404	1371	1338	1306	1273	1241	1209	1177	1146	1114	1083	16
17	1471	1437	1404	1371	1338	1305	1273	1240	1208	1177	1145	1114	1083	17
18	1470	1437	1403	1370	1337	1304	1272	1240	1208	1176	1145	1113	1082	18
19	1470	1436	1403	1370	1337	1304	1271	1239	1207	1175	1144	1113	1082	19
20	0.1469	1436	1402	1369	1336	1303	1271	1239	1207	1175	1143	1112	1081	20
21	1469	1435	1402	1368	1335	1303	1270	1238	1206	1174	1143	1112	1081	21
22	1468	1435	1401	1368	1335	1302	1270	1238	1206	1174	1142	1111	1080	22
23	1468	1434	1401	1367	1334	1302	1269	1237	1205	1173	1142	1111	1080	23
24	1467	1433	1400	1367	1334	1301	1269	1237	1205	1173	1141	1110	1079	24
25	0.1467	1433	1399	1366	1333	1301	1268	1236	1204	1172	1141	1110	1079	25
26	1466	1432	1399	1366	1333	1300	1268	1235	1204	1172	1140	1109	1078	26
27	1465	1432	1398	1365	1332	1300	1267	1235	1203	1171	1140	1109	1078	27
28	1465	1431	1398	1365	1332	1299	1267	1234	1202	1171	1139	1108	1077	28
29	1464	1431	1397	1364	1331	1298	1266	1234	1202	1170	1139	1108	1076	29
30	0.1464	1430	1397	1363	1331	1298	1266	1233	1201	1170	1138	1107	1076	30
31	1463	1429	1396	1363	1330	1297	1265	1233	1201	1169	1138	1106	1075	31
32	1463	1429	1396	1362	1329	1297	1264	1232	1200	1169	1137	1106	1075	32
33	1462	1428	1395	1362	1329	1296	1264	1232	1200	1168	1137	1105	1074	33
34	1461	1428	1394	1361	1328	1296	1263	1231	1199	1168	1136	1105	1074	34
35	0.1461	1427	1394	1361	1328	1295	1263	1231	1199	1167	1136	1104	1073	35
36	1460	1427	1393	1360	1327	1295	1262	1230	1198	1167	1135	1104	1073	36
37	1460	1426	1393	1360	1327	1294	1262	1230	1198	1166	1135	1103	1072	37
38	1459	1426	1392	1359	1326	1294	1261	1229	1197	1165	1134	1103	1072	38
39	1459	1425	1392	1359	1326	1293	1261	1229	1197	1165	1134	1102	1071	39
40	0.1458	1424	1391	1358	1325	1292	1260	1228	1196	1164	1133	1102	1071	40
41	1458	1424	1391	1357	1325	1292	1260	1227	1196	1164	1132	1101	1070	41
42	1457	1423	1390	1357	1324	1291	1259	1227	1195	1163	1132	1101	1070	42
43	1456	1423	1389	1356	1323	1291	1259	1226	1195	1163	1131	1100	1069	43
44	1456	1422	1389	1356	1323	1290	1258	1226	1194	1162	1131	1100	1069	44
45	0.1455	1422	1388	1355	1322	1290	1257	1225	1193	1162	1130	1099	1068	45
46	1455	1421	1388	1355	1322	1289	1257	1225	1193	1161	1130	1099	1068	46
47	1454	1421	1387	1354	1321	1289	1256	1224	1192	1161	1129	1098	1067	47
48	1454	1420	1387	1354	1321	1288	1256	1224	1192	1160	1129	1098	1067	48
49	1453	1419	1386	1353	1320	1288	1255	1223	1191	1160	1128	1097	1066	49
50	0.1452	1419	1386	1352	1320	1287	1255	1223	1191	1159	1128	1097	1066	50
51	1452	1418	1385	1352	1319	1287	1254	1222	1190	1159	1127	1096	1065	51
52	1451	1418	1384	1351	1319	1286	1254	1222	1190	1158	1127	1096	1065	52
53	1451	1417	1384	1351	1318	1285	1253	1221	1189	1158	1126	1095	1064	53
54	1450	1417	1383	1350	1317	1285	1253	1221	1189	1157	1126	1095	1064	54
55	0.1450	1416	1383	1350	1317	1284	1252	1220	1188	1157	1125	1094	1063	55
56	1449	1416	1382	1349	1316	1284	1252	1219	1188	1156	1125	1094	1063	56
57	1449	1415	1382	1349	1316	1283	1251	1219	1187	1156	1124	1093	1062	57
58	1448	1414	1381	1348	1315	1283	1250	1218	1187	1155	1124	1092	1062	58
59	1447	1414	1381	1348	1315	1282	1250	1218	1186	1154	1123	1092	1061	59
	2 8	2 9	2 10	2 11	2 12	2 13	2 14	2 15	2 16	2 17	2 18	2 19	2 20	

TABLE XIX.

Proportional Logarithms.

″ s.	° ′ h. m. 2 21	° ′ h. m. 2 22	° ′ h. m. 2 23	° ′ h. m. 2 24	° ′ h. m. 2 25	° ′ h. m. 2 26	° ′ h. m. 2 27	° ′ h. m. 2 28	° ′ h. m. 2 29	° ′ h. m. 2 30	° ′ h .m. 2 31	° ′ h. m. 2 32	° ′ h. m. 2 33	″ s.
0	0.1061	1030	0999	0969	0939	0909	0880	0850	0821	0792	0763	0734	0706	0
1	1060	1029	0999	0969	0939	0909	0879	0850	0820	0791	0762	0734	0705	1
2	1060	1029	0998	0968	0938	0908	0879	0849	0820	0791	0762	0733	0705	2
3	1059	1028	0998	0968	0938	0908	0878	0849	0819	0790	0762	0733	0704	3
4	1058	1028	0997	0967	0937	0907	0878	0848	0819	0790	0761	0732	0704	4
5	0.1058	1027	0997	0967	0937	0907	0877	0848	0818	0789	0761	0732	0703	5
6	1057	1027	0996	0966	0936	0906	0877	0847	0818	0789	0760	0731	0703	6
7	1057	1026	0996	0966	0936	0906	0876	0847	0817	0788	0760	0731	0703	7
8	1056	1026	0995	0965	0935	0905	0876	0846	0817	0788	0759	0730	0702	8
9	1056	1025	0995	0965	0935	0905	0875	0846	0816	0787	0759	0730	0702	9
10	0.1055	1025	0994	0964	0934	0904	0875	0845	0816	0787	0758	0730	0701	10
11	1055	1024	0994	0964	0934	0904	0874	0845	0816	0787	0758	0729	0701	11
12	1054	1024	0993	0963	0933	0903	0874	0844	0815	0786	0757	0729	0700	12
13	1054	1023	0993	0963	0933	0903	0873	0844	0815	0786	0757	0728	0700	13
14	1053	1023	0992	0962	0932	0902	0873	0843	0814	0785	0756	0728	0699	14
15	0.1053	1022	0992	0962	0932	0902	0872	0843	0814	0785	0756	0727	0699	15
16	1052	1022	0991	0961	0931	0901	0872	0842	0813	0784	0755	0727	0698	16
17	1052	1021	0991	0961	0931	0901	0871	0842	0813	0784	0755	0726	0698	17
18	1051	1021	0990	0960	0930	0900	0871	0841	0812	0783	0754	0726	0697	18
19	1051	1020	0990	0960	0930	0900	0870	0841	0812	0783	0754	0725	0697	19
20	0.1050	1020	0989	0959	0929	0899	0870	0840	0811	0782	0753	0725	0696	20
21	1050	1019	0989	0959	0929	0899	0869	0840	0811	0782	0753	0724	0696	21
22	1049	1019	0988	0958	0928	0898	0869	0839	0810	0781	0752	0724	0695	22
23	1049	1018	0988	0958	0928	0898	0868	0839	0810	0781	0752	0723	0695	23
24	1048	1018	0987	0957	0927	0897	0868	0838	0809	0780	0751	0723	0694	24
25	0.1048	1017	0987	0957	0927	0897	0867	0838	0809	0780	0751	0722	0694	25
26	1047	1017	0986	0956	0926	0896	0867	0837	0808	0779	0751	0722	0694	26
27	1047	1016	0986	0956	0926	0896	0866	0837	0808	0779	0750	0721	0693	27
28	1046	1016	0985	0955	0925	0895	0866	0836	0807	0778	0750	0721	0693	28
29	1046	1015	0985	0955	0925	0895	0865	0836	0807	0778	0749	0721	0692	29
30	0.1045	1015	0984	0954	0924	0894	0865	0835	0806	0777	0749	0720	0692	30
31	1045	1014	0984	0954	0924	0894	0864	0835	0806	0777	0748	0720	0691	31
32	1044	1014	0983	0953	0923	0893	0864	0834	0805	0776	0748	0719	0691	32
33	1044	1013	0983	0953	0923	0893	0863	0834	0805	0776	0747	0719	0690	33
34	1043	1013	0982	0952	0922	0892	0863	0834	0804	0775	0747	0718	0690	34
35	0.1043	1012	0982	0952	0922	0892	0862	0833	0804	0775	0746	0718	0689	35
36	1042	1012	0981	0951	0921	0891	0862	0833	0803	0774	0746	0717	0689	36
37	1042	1011	0981	0951	0921	0891	0861	0832	0803	0774	0745	0717	0688	37
38	1041	1011	0980	0950	0920	0890	0861	0832	0802	0774	0745	0716	0688	38
39	1041	1010	0980	0950	0920	0890	0860	0831	0802	0773	0744	0716	0687	39
40	0.1040	1009	0979	0949	0919	0889	0860	0831	0801	0773	0744	0715	0687	40
41	1040	1009	0979	0949	0919	0889	0859	0830	0801	0772	0743	0715	0686	41
42	1039	1008	0978	0948	0918	0888	0859	0830	0801	0772	0743	0714	0686	42
43	1039	1008	0978	0948	0918	0888	0858	0829	0800	0771	0742	0714	0686	43
44	1038	1007	0977	0947	0917	0887	0858	0829	0800	0771	0742	0713	0685	44
45	0.1037	1007	0977	0947	0917	0887	0857	0828	0799	0770	0741	0713	0685	45
46	1037	1006	0976	0946	0916	0886	0857	0828	0799	0770	0741	0712	0684	46
47	1036	1006	0976	0946	0916	0886	0856	0827	0798	0769	0740	0712	0684	47
48	1036	1005	0975	0945	0915	0885	0856	0827	0798	0769	0740	0711	0683	48
49	1035	1005	0975	0945	0915	0885	0855	0826	0797	0768	0740	0711	0683	49
50	0.1035	1004	0974	0944	0914	0884	0855	0826	0797	0768	0739	0711	0682	50
51	1034	1004	0974	0944	0914	0884	0855	0825	0796	0767	0739	0710	0682	51
52	1034	1003	0973	0943	0913	0883	0854	0825	0796	0767	0738	0710	0681	52
53	1033	1003	0973	0943	0913	0883	0854	0824	0795	0766	0738	0709	0681	53
54	1033	1002	0972	0942	0912	0883	0853	0824	0795	0766	0737	0709	0680	54
55	0.1032	1002	0972	0942	0912	0882	0853	0823	0794	0765	0737	0708	0680	55
56	1032	1001	0971	0941	0911	0882	0852	0823	0794	0765	0736	0708	0679	56
57	1031	1001	0971	0941	0911	0881	0852	0822	0793	0764	0736	0707	0679	57
58	1031	1000	0970	0940	0910	0881	0851	0822	0793	0764	0735	0707	0678	58
59	1030	1000	0970	0940	0910	0880	0851	0821	0792	0763	0735	0706	0678	59
	2 21	2 22	2 23	2 24	2 25	2 26	2 27	2 28	2 29	2 30	2 31	2 32	2 33	

TABLE XIX.

PROPORTIONAL LOGARITHMS.

″ s.	° ′ h. m 2 34	° ′ h. m. 2 35	° ′ h. m 2 36	° ′ h. m. 2 37	° ′ h. m 2 38	° ′ h. m. 2 39	° ′ h. m 2 40	° ′ h. m. 2 41	° ′ h. m. 2 42	° ′ h. m. 2 43	° ′ h. m. 2 44	° ′ h. m. 2 45	° ′ h. m. 2 46	″ s.
0	0.0678	0649	0621	0594	0566	0539	0512	0484	0458	0431	0404	0378	0352	0
1	0677	0649	0621	0593	0566	0538	0511	0484	0457	0430	0404	0377	0351	1
2	0677	0648	0621	0593	0565	0538	0511	0484	0457	0430	0403	0377	0351	2
3	0676	0648	0620	0592	0565	0537	0510	0483	0456	0430	0403	0377	0350	3
4	0676	0648	0620	0592	0564	0537	0510	0483	0456	0429	0403	0376	0350	4
5	0.0675	0647	0619	0591	0564	0536	0509	0482	0455	0429	0402	0376	0349	5
6	0675	0647	0619	0591	0563	0536	0509	0482	0455	0428	0402	0375	0349	6
7	0674	0646	0618	0591	0563	0536	0508	0481	0454	0428	0401	0375	0349	7
8	0674	0646	0618	0590	0562	0535	0508	0481	0454	0427	0401	0374	0348	8
9	0673	0645	0617	0590	0562	0535	0507	0480	0454	0427	0400	0374	0348	9
10	0.0673	0645	0617	0589	0562	0534	0507	0480	0453	0426	0400	0374	0347	10
11	0672	0644	0616	0589	0561	0534	0507	0480	0453	0426	0399	0373	0347	11
12	0672	0644	0616	0588	0561	0533	0506	0479	0452	0426	0399	0373	0346	12
13	0671	0643	0615	0588	0560	0533	0506	0479	0452	0425	0399	0372	0346	13
14	0671	0643	0615	0587	0560	0532	0505	0478	0451	0425	0398	0372	0346	14
15	0.0670	0642	0615	0587	0559	0532	0505	0478	0451	0424	0398	0371	0345	15
16	0670	0642	0614	0586	0559	0531	0504	0477	0450	0424	0397	0371	0345	16
17	0670	0641	0614	0586	0558	0531	0504	0477	0450	0423	0397	0370	0344	17
18	0669	0641	0613	0585	0558	0531	0503	0476	0450	0423	0396	0370	0344	18
19	0669	0641	0613	0585	0557	0530	0503	0476	0449	0422	0396	0370	0343	19
20	0.0668	0640	0612	0585	0557	0530	0502	0475	0449	0422	0395	0369	0343	20
21	0668	0640	0612	0584	0557	0529	0502	0475	0448	0422	0395	0369	0342	21
22	0667	0639	0611	0584	0556	0529	0502	0475	0448	0421	0395	0368	0342	22
23	0667	0639	0611	0583	0556	0528	0501	0474	0447	0421	0394	0368	0342	23
24	0666	0638	0610	0583	0555	0528	0501	0474	0447	0420	0394	0367	0341	24
25	0.0666	0638	0610	0582	0555	0527	0500	0473	0446	0420	0393	0367	0341	25
26	0665	0637	0609	0582	0554	0527	0500	0473	0446	0419	0393	0366	0340	26
27	0665	0637	0609	0581	0554	0526	0499	0472	0446	0419	0392	0366	0340	27
28	0664	0636	0609	0581	0553	0526	0499	0472	0445	0418	0392	0366	0339	28
29	0664	0636	0608	0580	0553	0526	0498	0471	0445	0418	0392	0365	0339	29
30	0.0663	0635	0608	0580	0552	0525	0498	0471	0444	0418	0391	0365	0339	30
31	0663	0635	0607	0579	0552	0525	0498	0471	0444	0417	0391	0364	0338	31
32	0663	0634	0607	0579	0552	0524	0497	0470	0443	0417	0390	0364	0338	32
33	0662	0634	0606	0579	0551	0524	0497	0470	0443	0416	0390	0363	0337	33
34	0662	0634	0606	0578	0551	0523	0496	0469	0442	0416	0389	0363	0337	34
35	0.0661	0633	0605	0578	0550	0523	0496	0469	0442	0415	0389	0363	0336	35
36	0661	0633	0605	0577	0550	0522	0495	0468	0442	0415	0388	0362	0336	36
37	0660	0632	0604	0577	0549	0522	0495	0468	0441	0414	0388	0362	0336	37
38	0660	0632	0604	0576	0549	0521	0494	0467	0441	0414	0388	0361	0335	38
39	0659	0631	0603	0576	0548	0521	0494	0467	0440	0414	0387	0361	0335	39
40	0.0659	0631	0603	0575	0548	0521	0493	0466	0440	0413	0387	0360	0334	40
41	0658	0630	0602	0575	0547	0520	0493	0466	0439	0413	0386	0360	0334	41
42	0658	0630	0602	0574	0547	0520	0493	0466	0439	0412	0386	0359	0333	42
43	0657	0629	0602	0573	0546	0519	0492	0465	0438	0412	0385	0359	0333	43
44	0657	0629	0601	0573	0546	0519	0492	0465	0438	0411	0385	0359	0333	44
45	0.0656	0628	0601	0573	0546	0518	0491	0464	0438	0411	0384	0358	0332	45
46	0656	0628	0600	0573	0545	0518	0491	0464	0437	0410	0384	0358	0332	46
47	0655	0628	0600	0572	0545	0517	0490	0463	0437	0410	0384	0357	0331	47
48	0655	0627	0599	0572	0544	0517	0490	0463	0436	0410	0383	0357	0331	48
49	0655	0627	0599	0571	0544	0517	0489	0462	0436	0409	0383	0356	0330	49
50	0.0654	0626	0598	0571	0543	0516	0489	0462	0435	0409	0382	0356	0330	50
51	0654	0626	0598	0570	0543	0516	0489	0462	0435	0408	0382	0356	0329	51
52	0653	0625	0597	0570	0542	0515	0488	0461	0434	0408	0381	0355	0329	52
53	0653	0625	0597	0569	0542	0515	0488	0461	0434	0407	0381	0355	0329	53
54	0652	0624	0596	0569	0541	0514	0487	0460	0434	0407	0381	0354	0328	54
55	0.0652	0624	0596	0568	0541	0514	0487	0460	0433	0406	0380	0354	0328	55
56	0651	0623	0596	0568	0541	0513	0486	0459	0433	0406	0380	0353	0327	56
57	0651	0623	0595	0568	0540	0513	0486	0459	0432	0406	0379	0353	0327	57
58	0650	0622	0595	0567	0540	0512	0485	0458	0432	0405	0379	0353	0326	58
59	0650	0622	0594	0567	0539	0512	0485	0458	0431	0405	0378	0352	0326	59
	2 34	2 35	2 36	2 37	2 38	2 39	2 40	2 41	2 42	2 43	2 44	2 45	2 46	

TABLE XIX.

PROPORTIONAL LOGARITHMS.

″ s.	° ′ h. m. 2 47	° ′ h. m. 2 48	° ′ h. m. 2 49	° ′ h. m. 2 50	° ′ h. m. 2 51	° ′ h. m. 2 52	° ′ h. m. 2 53	° ′ h. m. 2 54	° ′ h. m. 2 55	° ′ h. m. 2 56	° ′ h. m. 2 57	° ′ h. m. 2 58	° ′ h. m. 2 59	″ s.
0	0.0326	0300	0274	0248	0223	0197	0172	0147	0122	0098	0073	0049	0024	0
1	0325	0299	0273	0248	0222	0197	0172	0147	0122	0097	0073	0048	0024	1
2	0325	0299	0273	0247	0222	0197	0171	0146	0122	0097	0072	0048	0023	2
3	0324	0298	0273	0247	0221	0196	0171	0146	0121	0096	0072	0047	0023	3
4	0324	0298	0272	0247	0221	0196	0171	0146	0121	0096	0071	0047	0023	4
5	0.0323	0297	0272	0246	0221	0195	0170	0145	0120	0096	0071	0046	0022	5
6	0323	0297	0271	0246	0220	0195	0170	0145	0120	0095	0071	0046	0022	6
7	0323	0297	0271	0245	0220	0194	0169	0144	0119	0095	0070	0046	0021	7
8	0322	0296	0270	0245	0219	0194	0169	0144	0119	0094	0070	0045	0021	8
9	0322	0296	0270	0244	0219	0194	0169	0143	0119	0094	0069	0045	0021	9
10	0.0321	0295	0270	0244	0219	0193	0168	0143	0118	0093	0069	0044	0020	10
11	0321	0295	0269	0244	0218	0193	0168	0143	0118	0093	0068	0044	0020	11
12	0320	0294	0269	0243	0218	0192	0167	0142	0117	0093	0068	0044	0019	12
13	0320	0294	0268	0243	0217	0192	0167	0142	0117	0092	0068	0043	0019	13
14	0319	0294	0268	0242	0217	0192	0166	0141	0117	0092	0067	0043	0019	14
15	0.0319	0293	0267	0242	0216	0191	0166	0141	0116	0091	0067	0042	0018	15
16	0319	0293	0267	0241	0216	0191	0166	0141	0116	0091	0066	0042	0018	16
17	0318	0292	0267	0241	0216	0190	0165	0140	0115	0091	0066	0042	0017	17
18	0318	0292	0266	0241	0215	0190	0165	0140	0115	0090	0066	0041	0017	18
19	0317	0291	0266	0240	0215	0189	0164	0139	0114	0090	0065	0041	0017	19
20	0.0317	0291	0265	0240	0214	0189	0164	0139	0114	0089	0065	0040	0016	20
21	0316	0291	0265	0239	0214	0189	0163	0139	0114	0089	0064	0040	0016	21
22	0316	0290	0264	0239	0213	0188	0163	0138	0113	0089	0064	0040	0015	22
23	0316	0290	0264	0238	0213	0188	0163	0138	0113	0088	0064	0039	0015	23
24	0315	0289	0264	0238	0213	0187	0162	0137	0112	0088	0063	0039	0015	24
25	0.0315	0289	0263	0238	0212	0187	0162	0137	0112	0087	0063	0038	0014	25
26	0314	0288	0263	0237	0212	0187	0161	0136	0112	0087	0062	0038	0014	26
27	0314	0288	0262	0237	0211	0186	0161	0136	0111	0087	0062	0038	0013	27
28	0313	0288	0262	0236	0211	0186	0161	0136	0111	0086	0062	0037	0013	28
29	0313	0287	0261	0236	0211	0185	0160	0135	0110	0086	0061	0037	0012	29
30	0.0313	0287	0261	0235	0210	0185	0160	0135	0110	0085	0061	0036	0012	30
31	0312	0286	0261	0235	0210	0184	0159	0134	0110	0085	0060	0036	0012	31
32	0312	0286	0260	0235	0209	0184	0159	0134	0109	0084	0060	0036	0011	32
33	0311	0285	0260	0234	0209	0184	0158	0134	0109	0084	0059	0035	0011	33
34	0311	0285	0259	0234	0208	0183	0158	0133	0108	0084	0059	0035	0010	34
35	0.0310	0285	0259	0233	0208	0183	0158	0133	0108	0083	0059	0034	0010	35
36	0310	0284	0258	0233	0208	0182	0157	0132	0107	0083	0058	0034	0010	36
37	0310	0284	0258	0233	0207	0182	0157	0132	0107	0082	0058	0034	0009	37
38	0309	0283	0258	0232	0207	0181	0156	0131	0107	0082	0057	0033	0009	38
39	0309	0283	0257	0232	0206	0181	0156	0131	0106	0082	0057	0033	0008	39
40	0.0308	0282	0257	0231	0206	0181	0156	0131	0106	0081	0057	0032	0008	40
41	0308	0282	0256	0231	0205	0180	0155	0130	0105	0081	0056	0032	0008	41
42	0307	0282	0256	0230	0205	0180	0155	0130	0105	0080	0056	0031	0007	42
43	0307	0281	0255	0230	0205	0179	0154	0129	0105	0080	0055	0031	0007	43
44	0307	0281	0255	0230	0204	0179	0154	0129	0104	0080	0055	0031	0006	44
45	0.0306	0280	0255	0229	0204	0179	0153	0129	0104	0079	0055	0030	0006	45
46	0306	0280	0254	0229	0203	0178	0153	0128	0103	0079	0054	0030	0006	46
47	0305	0279	0254	0228	0203	0178	0153	0128	0103	0078	0054	0029	0005	47
48	0305	0279	0253	0228	0202	0177	0152	0127	0103	0078	0053	0029	0005	48
49	0304	0279	0253	0227	0202	0177	0152	0127	0102	0077	0053	0029	0004	49
50	0.0304	0278	0252	0227	0202	0176	0151	0126	0102	0077	0053	0028	0004	50
51	0304	0278	0252	0227	0201	0176	0151	0126	0101	0077	0052	0028	0004	51
52	0303	0277	0252	0226	0201	0176	0151	0126	0101	0076	0052	0027	0003	52
53	0303	0277	0251	0226	0200	0175	0150	0125	0100	0076	0051	0027	0003	53
54	0302	0276	0251	0225	0200	0175	0150	0125	0100	0075	0051	0027	0002	54
55	0.0302	0276	0250	0225	0200	0174	0149	0124	0100	0075	0051	0026	0002	55
56	0301	0276	0250	0224	0199	0174	0149	0124	0099	0075	0050	0026	0002	56
57	0301	0275	0250	0224	0199	0174	0148	0124	0099	0074	0050	0025	0001	57
58	0300	0275	0249	0224	0198	0173	0148	0123	0098	0074	0049	0025	0001	58
59	0300	0274	0249	0223	0198	0173	0148	0123	0098	0073	0049	0025	0000	59
	2 47	2 48	2 49	2 50	2 51	2 52	2 53	2 54	2 55	2 56	2 57	2 58	2 59	

APPENDIX;

CONTAINING

DIRECTIONS FOR ACQUIRING A KNOWLEDGE

OF THE

PRINCIPAL FIXED STARS.

INTRODUCTORY REMARKS.

1.—THE fixed Stars are so called from their appearing to retain the same positions with respect to each other. Some of the Stars have indeed been observed to change their relative places; but this change, which is called the *Proper Motion* of the Stars, is very slow, and could not be perceived without instruments in a period of more than a thousand years.

2.—The distance of the fixed Stars from the Earth is so great, that no method has yet been found by which the distance of any of them can be astertained; but it is known, that the nearest fixed Star is at least 80,000 times more distant than the Sun, whose distance from the Earth is about ninety-five millions of miles.* Now as the Sun's Parallax, that is the angle which the Semidiameter of the Earth would appear under to an eye in the Sun, is hardly 9″, it is plain that the Parallax of the fixed Stars, must be quite insensible. The immense distance of the Stars is no doubt also the cause of their appearing to have no apparent magnitude, when viewed by means of Telescopes of of the best construction.

3.—There can be little doubt of the fixed Stars being Bodies of the same nature as the Sun, and that each Star has a system of Planets which derive light and heat from it; for it is not reasonable to suppose that Bodies of such magnitude as the fixed Stars, must be, were created merely to give a faint light to the Inhabitants of this Earth, and the other Planets belonging to the Solar System. Indeed the Stars visible to the naked eye are not a thousandth part of what may be seen through a good Telescope, the far greater part of which cannot be said to give light, or to be in any way useful to mankind.

4.—The Stars that appear brightest to us are called Stars of the first Magnitude; the next in brightness, Stars of the second Magnitude, and so on, till those that can just be seen with the naked eye, which are called Stars of the sixth Magnitude; and the Stars that can only be seen with the assistance of a Telescope, are called Telescopic Stars. Those parts of the Heavens that have the appearance of whitish clouds to the eye, are found to be collections of Telescopic Stars: these clusters are called *Nebulæ*. The *Milky Way* is the most conspicuous and extensive Nebula, and the next is the *Magellanic Clouds.* The latter can only be seen in Southern Latitudes, or in places a few degrees North of the Equator.

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* See Brinkley's Elements of Astronomy, page 127, second Edition

5.—The number of Stars visible to the naked eye, is far from being so great, as is generally imagined by those who have not paid attention to this subject. It is very seldom that more than *one thousand Stars* can be seen at a time. The number of Stars of the first magnitude is only about twenty, and the Stars of the second magnitude amount only to about fifty, in all parts of the Heavens. It is therefore far from being difficult to obtain a knowledge of the principal Stars.

6.—Some Stars disappear at times, and after remaining invisible during a certain interval, again make their appearance, in the same place as before: these are called *Periodical Stars.* Others are observed to be brighter at certain times than they are at other times, but never disappear altogether: these are termed *Variable Stars.* It is very probable that the Phenomena of the Periodical and Variable Stars arise from the motion of the Stars on their axis, and from some of them shewing more light from one side than from the other.

7.—Several of the Stars that appear single to the naked eye, are found, when viewed through a telescope, to consist of two and some of three or four Stars: these are called Double, Treble, &c. Stars. It is probable that the Stars forming these are at great distances from each other, and that the reason of their appearing to us to be so near each other, is from the Stars being nearly in the same line when seen from the Earth.

8.—It has been found convenient to divide the Stars into groups called CONSTELLATIONS; to each of which is given the name of some celebrated man, or of some animal or other terrestrial object. Many of the principal Stars have also particular names, but as it would only create confusion to have a name, even, for every Star visible to the naked eye, Astronomers distinguish the Stars as follows: the first letter of the Greek alphabet being attached to the name of any Constellation, points out the brightest Star in that Constellation; the second letter the next in brightness, and so on. When the number of Stars in a Constellation exceeds the number of letters in the Greek alphabet, the letters of the Italic alphabet are next used, then those of the Roman alphabet, if required: and when the number of Stars is greater than the number of letters in these three alphabets, the remaining Stars are distinguished by means of the common numericals.

9.—An imaginary Circle in the Heavens, or *Celestial Sphere,* coinciding with the *Equator,* is called the EQUINOCTIAL, and that which coincides with the *orbit* or *path* in which the Earth moves in its revolution round the Sun, is called the ECLIPTIC. The Equinoctial and Ecliptic cross or cut each other in opposite points, making angles of about $23\frac{1}{2}°$ at those points, and their distance from each other when greatest, that is at 90° from the points where the Circles cross each other is equal to the Angle at either of the Points, or $23\frac{1}{2}°$.

10.—The *Poles* of the Equinoctial are two opposite points in the Celestial Sphere, 90° distant from every part of the Equinoctial Circle; and the *Poles* of the Ecliptic are two Points in the Celestial Sphere, 90° distant from every part of the Ecliptic. Hence the Poles of the Equinoctial and Ecliptic are 23½° distant from each other.

11.—The distance of a Star from the Equinoctial is called its DECLINATION, and the LATITUDE of a Star is its distance from the Ecliptic. The LONGITUDES and RIGHT ASCENSION of the Stars are reckoned Eastward from the Vernal Equinox, that is, from the Point where the Sun's Centre crosses the Equinoctial about the 20th of March, the right ascension being measured by an Arch of the Equinoctial, contained between the Vernal Equinox, and the Point where a great Circle passing through the Pole of the Equinoctial and the given Star, cuts the Equinoctial; and the Longitude, by an Arch of the Ecliptic, contained between the Vernal Equinox, and the Point where a great Circle passing through the Pole of the Ecliptic and the Star, cuts the Ecliptic; therefore, the Longitude or Right Ascension of a Star may be any Arch less than 360°, but neither the Declination nor Latitude of a Star, can exceed 90°. The Right Ascension of any object is generally given in time, at the rate of one hour to fifteen degrees, this being more convenient for general purposes. The practical Navigator requires only to know the Right Ascension and Declination of a Star, for the purpose of deducing the Latitude, or Time, from its Altitude.

12.—The *ZODIAC* is an imaginary Zone or Belt in the Heavens, extending 8° on each Side of the Ecliptic, quite round the Celestial Sphere, and contains the Orbits or Ecliptics of the Planets.* There are twelve Constellations in the Zodiac, which have the same names as the twelve spaces, called the Signs of the Zodiac, each of which occupies 30° along the Ecliptic. Formerly the Constellations were actually contained in these Spaces or Signs; but at present, each Constellation is nearly one sign more to the Eastward, with respect to the Signs of the Zodiac, that is, the first Constellation, is now in the Second Sign, and so on. This is occasioned by a slow change in the direction of the Earth's axis, with respect to the fixed Stars, which causes the *Plane* of the Equinoctial to change its position, whilst that of the Ecliptic remains fixed, or very nearly so. Hence arise the *Precession* of the Equinoxes, and the *Variations* in the Longitudes. Right Ascensions, and Declinations of the fixed Stars.

The number of Constellations in the Heavens, is about one hundred. The following List is mostly copied from *Mackay's* work on the Longitude.

CONSTELLATIONS AND SIGNS IN THE ZODIAC.

Latin Names.	*English Names.*	Characters.	*Latin Names.*	*English Names.*	Characters.
1 Aries	The Ram	♈	7 Libra	The Balance	♎
2 Taurus	The Bull	♉	8 Scorpio	The Scorpion	♏
3 Gemini	The Twins	♊	9 Sagittarius	The Archer	♐
5 Cancer	The Crab	♋	10 Capricornus	The Goat	♑
4 Leo	The Lion	♌	11 Aquarius	The Water Bearer	♒
6 Virgo	The Virgin	♍	12 Pisces	The Fishes	♓

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* The Orbits of some of the lately discovered Planets are not contained within the Zodiac. These Planets are very small, and can only be seen by means of a good Telescope.

CONSTELLATIONS IN THE NORTHERN HEMISPHERE.

Latin Names.	*English Names.*	*Latin Names.*	*English Names.*
1 Ursa Minor,	The Little Bear.	21 Andromeda.	
2 Ursa Major,	The Great Bear.	22 Triangulum Borealis,	Northern Triangle.
3 Draco,	The Dragon.	23 Coma Berenices,	Berenice's Hair.
4 Cepheus.		24 Camelopardalus,	The Camelopard.
5 Bootes.		25 Monoceros,	The Unicorn.
6 Corona Borealis,	The Northern Crown.	26 Triangulum Minus,	The Little Triangle.
7 Hercules,		27 Lynx,	The Lynx.
8 Lyra,	The Harp.	28 Leo Minor,	The Little Lion.
9 Cygnus,	The Swan.	29 Asterion et Chara,	The Greyhounds.
10 Cassiopeia		30 Cerberus,	
11 Perseus.		31 Vulpecula et Anser,	The Fox and Goose.
12 Auriga,	The Waggoner.	32 Scutum Sobieski,	Sobieski's Shield.
13 Serpentarius.		33 Lacerta,	The Lizard.
14 Serpens,	The Serpent.	34 Mons Mænalus,	Mountain of Arcadia.
15 Sagitta,	The Arrow.	35 Cor Caroli,	Charles' Heart.
16 Aquila,	The Eagle.	36 Renne,	The Rein Deer.
17 Antinous.		37 Taurus Regalis,	The Royal Bull.
18 Delphinus,	The Dolphin.	38 Friedrick's Ehre,	Frederick's Glory.
19 Equleus,	The Horse Head.	39 Tubus Herscheli, Major	Herschel's Great Telescope.
20 Pegasus,	The Flying Horse.		

CONSTELLATIONS IN THE SOUTHERN HEMISPHERE.

Latin Names.	*English Names.*	*Latin Names.*	*English Names.*
1 Cetus,	The Whale.	25 Chamelion,	The Chameleon.
2 Orion.		26 Triangulum Australis,	Southern Triangle.
3 Eridanus,	The River Eridanus.	27 Pisces Volans,	The Flying Fish.
4 Lepus,	The Hare.	28 Dorado,	The Sword Fish.
5 Canis Major,	The Great Dog.	29 Toucan,	The American Goose
6 Canis Minor,	The Little Dog.	30 Hydrus,	The Water Snake.
7 Argo Navis,	The Ship Argo.	31 Sextans,	The Sextant.
8 Hydra,	The Hydra.	32 Apparatus Sculptoris.	
9 Crater,	The Cup.	33 Fornax Chimiæ,	Chemical Furnace.
10 Corvus,	The Crow.	34 Horologium,	The Clock.
11 Centaurus,	The Centaur.	35 Reticulus.	
12 Lupus,	The Wolf	36 Cælum Scalptorium,	The Graving Tool.
13 Ara,	The Altar.	37 Equuleus Pictoris,	The Painter's Easel.
14 Corona Australis,	Southern Crown.	38 Pyxis Nautica,	Mariner's Compass.
15 Pisces Australis,	Southern Fish.	39 Antlia Pneumatica,	The Air Pump.
16 Columba Noachi,	Noah's Dove.	40 Octans,	Hadley's Quadrant.
17 Robur Carolinum,	The Royal Oak.	41 Circinus,	Pair of Compasses.
18 Grus,	The Crane.	42 Norma,	Square and Rule.
19 Phœnix,	The Phenix.	43 Telescopium,	The Telescope.
20 Indus,	The Indian.	44 Microscopium,	The Microscope.
21 Pavo,	The Peacock.	45 Mons Mensæ,	Table Mountain.
22 Avis Indica,	Bird of Paradise.	46 Solitaire,	The Indian Bird.
23 Musca,	The Fly.	47 Psalterium Georgianum,	Georgian Psaltery
24 Crux,	The Cross.	48 Tubus Herschelii Minor,	Herschel's Small Telescope.

Several of these Constellations, as is evident from their names, have been formed of late years, partly from the Stars lying between the ancient Constellations, and partly from some of the more remote Stars, which formerly belonged to the old Constellations. In general the new Constellations are smaller, and contain fewer Stars than the old ones. The numbers prefixed to the Zodiacal Constellations, shew the order in which they, as well as the Signs of the Zodiac, are placed. The Numbers of the other Constellations are prefixed merely for the sake of reference.

It has been before remarked, that the Stars in the respective Constellations are represented by the letters in the Greek alphabet; the brightest Star being represented by the first letter, and so on. It may therefore be useful to give some of the first letters of that alphabet with their names or sounds in English.

	Letters.	Names.		Letters.	Names.
1	α	Alpha	6	ζ or ζ	Zeta.
2	β	Beta	7	η	Eta
3	γ	Gamma	8	ϑ or θ	Theta
4	δ	Delta	9	ι	Iota
5	ε	Epsilon	10	ϰ	Kappa

These letters will be sufficient to distinguish the principal fixed Stars. In the folowing directions, and in Table I, the letter for any Star is merely attached to the Name of the Constellation. Thus, *Aldebaran* is marked α *Taurus*, and *Pollux,* β *Gemini.* It may, however, be observed, that the proper designation of these Stars is α *Tauri* and β *Geminorum:* the meaning being α in Taurus, β in Gemini, and the same may be understood of the others.

The distances between the Stars which are given in the following directions, are to the nearest half degree, and may be readily measured with a Quadrant or Sextant.*

The Bearing is the Azimuth Circle which a Star is in, when the Star from which the Bearing is given is in the Zenith: from this Bearing, the direction between the two Stars is easily estimated at any other time: the Stars are distinguished in the usual Astronomical method; that is, by giving the name of the Constellation in which a Star is situated, with the Greek letter which marks the given Star prefixed, and when the Star has a *proper name*, such as Aldebaran, Castor, &c. it is also given. The Names of the Stars used in the Nautical Almanack for finding the Longitude by Lunar Observations, are printed in small Capitals, the Names of the others in Italics. The number included in a Parenthesis after the name of a Star, refers to the *magnitude* of the Star. Thus *Sirius* (1) signifies that *Sirius* is of the first *magnitude:* and α *Aquilæ* or *Altair* (1, 2) means that this Star is between the first and second *magnitudes.*

As the *Pleiades* or *Seven Stars* are almost universally known, and can be seen in all parts of the habitable Globe, we shall commence at this point, and first give directions for knowing the principal Stars in and near the Zodiac, next for the Stars in the Northern Hemisphere, and lastly for those in the Southern Hemisphere.

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* The Instrument, called a Cross Staff, which was formerly used in observing Altitudes at Sea, would measure the angular distance between two Stars with sufficient exactness for what is required here.

DIRECTIONS FOR FINDING THE PRINCIPAL FIXED STARS IN AND NEAR THE ZODIAC.

The *Pleiades*, or *Seven Stars*, are in the Constellation Taurus, their declination is about 23½° N. and they pass the meridian a few minutes before 9 P.M. on the first day of the year. Nearly S.E. by E. from the Pleiades, at the distance of 14°, is α Taurus, or ALDEBARAN: this Star, which is sometimes called the *Bull's Eye*, has a reddish appearance, and is very easily known. Nearly in a line from the Pleiades, through ALDEBARAN, at the distance of 16° from the latter, is α Orion, or *Bellatrix* (2): about 7½° East, a little Northerly from Bellatrix, is α Orion, or *Betelguse* (1): this Star has a reddish appearance nearly like ALDEBARAN: about 9½° S.W. of Betelguse are three Stars of the second magnitude, nearly in the same line with each other: these Stars are in the *Belt* of *Orion*. Nearly in a line from *Betelguse*, through the middle Star in the *Belt* of *Orion*, and at the distance of 9° from the Belt, is β Orion, or *Rigel* (1): 8½° E. ½ S. from Rigel, and in a line from Bellatrix through the Northern part of Orion's Belt, is κ *Orion* (2, 3). *Bellatrix*, *Betelguse*, *Rigel*, and κ *Orion*, form a trapezium round Orion's Belt, which is sometimes called the Square of Orion.

Nearly in the same line with Pleiades and Orion's Belt, and about 21½° S.E. of the Southern Star of the Belt, is α Canis Major, or *Sirius* (1): this Star is often called the Dog Star; it is the brightest fixed Star in the Heavens. About 26° nearly East of Betelguse, and nearly the same distance N.E. of Sirius, is α Canis Minor, or *Procyon* (1, 2). *Sirius*, *Betelguse*, and *Procyon* form nearly an Equilateral Triangle. A line from *Rigel* through the middle of Orion's Belt will point out α Gemini or *Castor* (1), the distance between *Rigel* and *Castor* being about 53°: 4½° to the S.E. of Castor, is β Gemini or POLLUX (1): this Star passes the meridian about eleven minutes after *Castor*, and about 4½ minutes after *Procyon*.

At the distance of 37½° from *Procyon*, and nearly in a line with it and the Southern Star in Orion's Belt, is α Leo or REGULUS (1); and nearly in the same line, at the distance of 24½° E. b. N. from REGULUS, is β Leo or *Deneb* (2): about 35½° E.N.E. from *Deneb*, or a little North of a line from REGULUS through *Deneb*, is α Bootes or *Arcturus* (1): about 33° S.S.W. of *Arcturus*, and 35° S.E. of *Deneb*, is α Virgo or SPICA (1). *Deneb*, *Arcturus*, and SPICA form nearly an Equilateral Triangle, and nearly in the Centre of this Triangle is ε Virgo or *Vindimiatrix* (2, 3).

Nearly in a line from REGULUS, through SPICA, at the distance of 45½° from the latter, is α Scorpio, or ANTARES (1): this Star has a reddish appearance, like ALDEBARAN, or *Betelguse*. A little North of a line joining SPICA and ANTARES, and about 21° from SPICA, is α Libra, or *Zubensech* (2, 3): this is a double Star, about 9° N. E. of *Zubenesch*, is β Libra, or *Zubenelg* (2, 3). At the distance of 60° N. E. b. E. from ANTARES, is α Aquila, or ALTAIR: this Star may also be known by its being 100° E. b. N. from SPICA, and a little North of a line from SPICA, through *Zubenelg*, and by its being situated in the Southern border of the Milky Way, considerably distant from any other bright Star.

About 14° N.E. b. E. of ALTAIR, are four Stars of the third or fourth magnitude, in the constellation Delphinus: these four Stars are very near each other, and form a kind of lozenge or diamond figure. A line from ALTAIR through this figure, at the distance of 49° from ALTAIR, will point out β Pegasus, or *Scheat* (2). 14° East of *Scheat*, is α Andromeda, or *Alpheratz* (2). 14° South, a little Westerly from *Alpheratz*, is γ Pegasus, or *Algenib* (2). 17° nearly West of *Algenib*, and 13° South of *Scheat*, is α Pegasus or MARCAB (2). *Scheat*, *Alpheratz*, *Algenib*, and MARCAB, form what is generally called the Square of the Pegasus, or the Flying Horse; MARCAB being in the S.W. Corner of the Square.

A line from *Scheat*, through MARCAB, being produced to the distance of 44° from the latter Star, will point out α Pisces Australis, or FOMALHAUT (1). ALTAIR, MARCAB, and FOMALHAUT form nearly a right angled triangle, the right angle being at MARCAB. Nearly in a line joining MARCAB and the Pleiades, and about 23° West of the latter, is α Aries, or ARIETIS (2. 3). ARIETIS may also be known by being a little to the S.W. of a line from Betelguse through ALDEBARAN, its distance from the latter Star being 36½°. About 4° S.W. b. W. from ARIETIS, is β Aries (3). 23½° S.E. b. S. from ARIETIS, and a little North of a line from *Betelguse* through *Bellatrix*, at the distance of 36° from the latter Star, is α Cetus, or *Menkar* (2). *Menkar* may also be known by being in a line with *Rigel* and *Algenib*, and rather nearer to *Rigel* than to *Algenib*. About 5° W.S.W. of *Menkar*, is γ Cetus (3).

DIRECTIONS FOR KNOWING THE PRINCIPAL FIXED STARS IN THE NORTHERN HEMISPHERE.

The *Pole Star*, or α *Ursa Minor*, is very generally known: this Star is between the second and third magnitudes, and is situated in the point of the tail of the Little Bear. A line from *Procyon* through *Castor*, will nearly fall into the *Pole Star*, at the distance of 58° from *Castor*.

The most conspicuous Constellation near the North Pole, is Ursa Major, or the Great Bear; there are seven bright Stars in this Constellation, between the first and third magnitudes. When these Stars are near the meridian, above the Pole, the four Western Stars form a trapezium, and because a line through the two Stars farthest to the Westward will nearly fall into the *Pole Star*, they are called the *Pointers*. The northern pointer, is α Ursa Major, or *Dubhe* (2. 1); and the southern pointer, or that farthest from the Pole Star, is β Ursa Major (2). The most northern of the two Eastern Stars of the Trapezium, is δ Ursa Major, and the other is γ. These four Stars are in the Body of the Great Bear. The three remaining Stars are in the Tail; that next the Body is ε Ursa Major, or *Alioth* (2, 3); the next to this, is ζ, or *Alcor* (2, 3); and the one in the point of the tail, is η, or *Benetnach* (2, 3). The seven most conspicuous Stars in Ursa Minor form a figure, which has a great resemblance to that formed by the seven Stars already described in Ursa Major; α Ursa Minor, or the *Pole Star*, being, as before observed, in the point of the tail.

A line from *Rigel* to the *Pole Star* will nearly intersect α Auriga, or *Capella* (1). This Star is 43½° from the *Pole Star*, and 54° from *Rigel*. *Capella* may also be known by its being in a line from *Menkar* through the *Pleiades*, and about 28° to the N.E. of that cluster. About 7½° E. b. S. from *Capella*, is β Auriga (2, 3).

Nearly in a line between *Benetnach*, the Star in the point of the tail of the Great Bear, and *Deneb*, in the tail of the Lion, is α Cor Caroli (3). This Star is about 28° from *Deneb*, and 14½° from *Benetnach*. A little East of a line joining α Cor Caroli and *Deneb*, is the Nebulous Constellation of Coma Berenices.

About 26½° from the *Pole Star*, and nearly in a line joining it and *Arcturus*, is α Draco (2, 3). About 19° E.N.E. of *Arcturus*, and nearly in a line with *Dubhe* and *Alcor*, is α Corona Borealis, or *Alphacca* (2). *Alphacca* and seven other Stars of the 4th and 5th magnitudes, form a circular figure, which is very easily distinguished: these eight Stars are all in the Constellation of the Northern Crown.

A line from *Arcturus* through the northern part of the circular figure in the Northern Crown, will point out α Lyra, or *Vega* (1); the distance between *Arcturus* and *Vega* being 59°. About 24° E.N.E. of *Vega*, is α Cygnus, or *Arided* (2. 1).* *Vega*, *Arided*, and ALTAIR, form nearly a right angled triangle, the right angle being at *Vega*. ALTAIR is about 34½° from *Vega*, and 38° from *Arided*.

About 18° N.N.E. from *Arided*, is α Cepheus, or *Alderamin* (3); and 20½° E. b. N. from *Alderamin*, is β Cassiopeia (2, 3): this Star, *Scheat*, and *Arided*, form nearly an equilateral triangle, the side of which is about 33½°. At the distance of 5° nearly East of β Cassiopeia, is α Cassiopeia, or *Schedar* (2, 3). Some of the Stars in the Constellation of Cassiopeia form a figure which resembles a chair.

A line from *Alioth* (the Star in the tail of the Great Bear, which is nearest to the body) through the *Pole Star*, being continued, will pass through the middle of the Constellation of Cassiopeia: the principal Stars in this Constellation are nearly at the same distance from the *Pole Star* as those of the Great Bear.

Nearly in a line with *Schedar* and β Cassiopeia, at the distance of 19½° from *Schedar*, is γ Andromeda, or *Almaach* (2); and about 13° W.S.W. of *Almaach*, is β Andromeda, or *Mirach* (2): this Star, with β Cassiopeia and *Almaach*, forms nearly a right angled triangle, the right angle being at *Almaach*.

About 12° E.S.E. from Almaach, is β Perseus, or *Algol*: this is one of the most remarkable of the *Variable Stars*, it being when brightest of the second *magnitude*, and when least bright only of the fourth. About 9½° N.N.E. of *Algol*, is α Perseus, or *Algenib* (2): this Star may also be known by being nearly in a line with POLLUX and *Capella*, and about 19° to the W.N.W. of the latter.

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* This Star is often called *Deneb*, as well as *Arided*; we have chosen the latter name, in order to distinguish it from *Deneb* in the tail of the Lion.

DIRECTIONS FOR FINDING THE PRINCIPAL FIXED STARS IN THE SOUTHERN HEMISPHERE.

A little West of a line from ALDEBARAN through *Rigel*, at the distance of 46½° from the latter Star, is α Argo Navis, or *Canopus* (1): this is a very bright Star, and may also be known by its being a little East of a line from *Castor* through *Sirius*, and about 37½° nearly South of the latter Star. About 20° N.N.W. of *Canopus*, is α Columba Noachi (2).

In a line from *Betelguse* through *Sirius*, and about 73° from the latter Star, are four bright Stars, forming the Constellation called Crux, or the Cross. The Stars in this Constellation are disposed as follows: α (1) is the most southern Star, and is in the foot of the Cross; β (1.2) is in the Eastern arm; γ (2) in the head, and δ (3) in the Western arm. About 12° E.N.E. of α Crux, is β Centaurus (1), and 5° East of this Star, is α Centaurus (1).*

About 42° East, a little Northerly from α Centaurus, and 52° S. b. E. of ANTARES, is α Pavo (2). About 40° East of α Pavo, and 39° S.E. b. S. of FOMALHAUT, is α Eridanus, or *Achernar*; these three Stars form nearly an equilateral triangle.

A line from *Castor* through POLLUX, will point out α Hydra, or *Alphard* (2); this Star being about 44° to the S.E. of POLLUX, and 23° S.S.W. of REGULUS. *Procyon*, *Alphard*, and REGULUS form nearly a right angled triangle, the right angle being at *Alphard*.

ON FINDING THE LATITUDE BY THE FIXED STARS.

The best times for observing the Altitude of a Star, is during the morning or evening twilight, or when there is moonlight; the horizon being more distinct at these times than it is when the night is dark. A little practice will, however, enable a person to take the Altitude of a Star with sufficient accuracy, for nautical purposes, during any tolerably clear night.

When observing the Altitude of a Star by the common Quadrant, the horizon will be better seen if the *sight vane* be turned horizontally, and the sight directed over it, instead of through the hole.

To find the Latitude by the Meridian Altitude of a Fixed Star.

RULE.

1. From the Observed Altitude of the Star subtract the Correction from Table III. the remainder will be the true Altitude, which being subtracted from 90°, will give the Star's Zenith Distance, which is to be called North or South, according as the observer is North or South of the Star when its Altitude is observed.

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* It must be observed, that when circumpolar Stars are near the meridian below the Pole, the bearing or direction between the Stars appears to be reversed: thus the pointers to the North Pole Star, which are the two western of the seven bright Stars in the *Great Bear*, appear to be to the eastward of the others, when that constellation is near the meridian below the Pole

2. Find the Declination of the Star by Table I. Then if the Zenith Distance and Declination be both North, or both South, add them together, the *sum* will be the Latitude, of the same Name with the Declination; but if one be North and the other South, their *difference* will be the Latitude, of the same Name with the greater.

EXAMPLE I.

In 1824, the observed meridian altitude of *Sirius*, South of the Observer, being 37° 49′, and height of the eye 16 feet, required the Latitude?

Observed altitude of Sirius	37°49′ .0
In Table III. under 16 feet and opposite 40° is	— 5 .0
True altitude of Sirius	37 44 .0
	90
Zenith distance	52 16 .0 N
Declination of Sirius in 1824	16 28 .8 S
Latitude	35 47 .2 N

EXAMPLE II.

In May 1829, required the Latitude where the observed meridian altitude of *Arcturus*, south of the observer, is 63° 24′, the height of the eye being 18 feet?

Observed altitude of Arcturus	63°24′ .0
Correction from Table III.	— 4 .8
Star's true altitude	63 19 .2
	90
Star's zenith distance	26 40 .8 N
Declination of Arcturus in 1824, 20° 6′ 12″N Ann Var.—19″ × 5⅓′ - - = — 1 41 } Decln. in May 1829	20 4 .5 N
Latitude	46 45 .3 N

EXAMPLE III.

In 1826, the meridian altitude of *Canopus*, south of the observer, being 69° 51′, height of the eye 12 feet, required the Latitude?

Star's observed altitude	69°51′ .0
Correction from Table III.	— 3 .7
Star's true altitude	69 47 .3
	90
Star's Zenith distance	20 12 .7 N
Declination of Canopus in 1826	52 36 .2 S
Latitude	32 23 .5 S

When the altitude of a Star is observed on the meridian *below* the Pole, the Latitude is found by adding together the Star's true altitude and its polar distance. The Latitude will, in this case, be always of the same Name with the declination of the Star.

EXAMPLE.

In 1825 the altitude of γ Draco, or *Rastaban*, observed on the meridian, below the Pole, being 14° 11′, and the height of the eye 12 feet: required the Latitude?

Observed altitude of *Rastaban*	14° 11′.0
Correction from Table III.	7.1
Star's true altitude	14 3.9
90—51° 30′.8 the Star's decln. = Star's polar distance	38 29.2
Latitude	52 33.1.N

The time of a Star's passing the meridian, below the Pole, is 11h. 58m. different from the time when it passes the opposite meridian; therefore 11h. 58m. being subtracted from the time of a Star's passing the meridian, as found by Tables I. and II., the remainder will shew the time of the *preceding* transit below the Pole, or if 11h. 58m. be added to the time given by Tables I. and II. the sum will be the time of the *following* transit below the Pole:

To find the Latitude in the Northern Hemisphere, by an Altitude of the North Pole Star.

RULE.

1. Find the time of the Pole Star's passage, over the meridian, by Tables IV. and V.; subtract this time from the apparent time at the Ship,* increased by 24 hours, if necessary, the remainder will shew the time that the Pole Star is past the Meridian, at the time of observation.

2. Enter Table VI. with the Time that the Pole Star is past the Meridian, and take out the corresponding correction, which being added to, or subtracted from, the true altitude of the Pole Star, as directed in the table, the sum or difference will be the Latitude

EXAMPLE I.

In Longitude 25° W. on the 18th March, 1824, at 8h. 30m. P. M. nautical time, the observed altitude of the Pole Star was 36° 30′; height of the eye 18 feet: required the Latitude?

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* By apparent time at the Ship, is meant the apparent astronomical time, which is *always* 24 hours behind the nautical time. For example, 5 P. M. on May 4th, by nautical time, is 5h. on May 3d, by astronomical time; or 6 A. M May 10th, nautical time, is 18h. on the 9th May, by astronomical time.

Observed altitude of the Pole Star				36°	30′
Correction from Table III.				—	5
True altitude of the Pole Star				36	25
	h.	m.			
App. astron. time at ship, Jan. 17th.	8	30			
Pole Star passes merid. on that day,	1	9			
Pole Star past meridian	7	21	Corr. in Table VI. add	0	34
Latitude				36	59

EXAMPLE II.

October 5th, 1829, at 10h. 28m. A. M. nautical time, Longitude 160° E. the observed altitude of the Pole Star being 29° 54′; height of the eye 20 feet: required the Latitude?

Observed altitude of the Pole Star				29°	54′
Correction from Table III.				—	6
True altitude				29	48
	h.	m.			
App. astron. time at Ship, 4th Oct.	10	28			
Pole Star passes mer. place of obsn. that day	12	19*			
Pole Star past the Meridian	22	9	Cor.fromTab.VI.sub.	1	26
Latitude				28	22

If the apparent time at the ship be uncertain, this method of finding the Latitude is liable to an error on that account; this error is, however, very small, when the Pole Star is near the meridian, either above or below the Pole; but when the Star is either about 6 or 18 hours past the meridian, 2 minutes of error in the time will cause nearly an error of 1 minute in the Latitude. It may also be observed, that the quantities in Table VI. answer to Sidereal Time; but the difference between the time of the transit of the Pole Star and the apparent time at the Ship is Solar Time, it should therefore be increased by 1 minute for every 6 hours. Thus, if the Pole Star is found to be 16h. 49m. past the meridian, it should be called 16h. 52m. and so on. There are some other small corrections to be applied when the Latitude is required to the greatest nicety;† but the Latitude, as found by the method here given, will seldom differ more than 1 or 2 minutes from the truth, and is therefore sufficiently exact for common nautical purposes.

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* To the time in Table IV. 2 minutes are added for the Longitude, and 2 for the time after 1824. See explanations of Tables IV. and V

† See SCHUMACHER's Ephemeris of the Planets, and LYNN's Star Tables.

EXPLANATION

OF

THE TABLES

TABLE I.

Right Ascensions and Declinations of the Principal Fixed Stars. Adapted to the beginning of the Year 1824.

This table contains the *mean* right ascensions and declinations of 61 Stars, for the beginning of the Year 1824; and by means of the annual variations, the right ascension or declination of any of these Stars may be found for 30 Years after 1824, with sufficient accuracy for nautical purposes.

EXAMPLE.

Required the right ascension and declination of ALDEBARAN, about the first of September 1827.

	h.	m.	s.
Right ascension of Aldebaran at the beginning of 1824	4	25	50 .0
Annual variation, 3s.4 × $3\frac{2}{3}$ = - - - - - - - -	+		12 5
Right ascension of Aldebaran at the begin. of Sept. 1827	4	26	2.5
Declination of Aldebaran at the beginning of 1824 . .	16°	8′	54″N.
Annual variation + 8″ × $3\frac{2}{3}$ = - - - - - - - - -	+		29
Declination of Aldebaran at the beginning of Sept. 1827	16	9	23

Note.—In this Table the *proper names* of the Stars from which the Moon's distance is given in the Nautical Almanac, are printed in Capitals, and the names of the others in Italics. The Greek letter, by which a Star is distinguished, is attached to the name of the constellation, without any change in the termination to signify that the Star is in, or of, that constellation; this is done for the sake of simplicity, and to have the Latin name of the constellation opposite to the English one, which is generally given in the other side of the page. Thus, the first Star in the Table is γ Pegasus; but the usual method of distinguishing this Star is γ Pegasi, the meaning being γ in Pegasus, and the same may be understood of the others.

TABLE II.

Time to be added to the Right Ascension of a Star, to find the Time of its passing the Meridian on any Day of the Year.

This table contains the complement, to the 24 hours, of the Sun's mean right ascension, for every day of the Year, which, being added to the right ascension of any Star, the sum, rejecting 24 hours if it exceed that quantity, will show the *apparent time* when that Star passes the meridian sufficiently exact for the purpose of observing the meridian altitude, to find the Latitude of the Ship; or for finding any particular Star, by observing its altitude when on the meridian.

EXAMPLES.

1. At what time does **Regulus** pass the meridian on the 5th March?

		h.	m.
Right ascension of *Regulus* - - - - - - - - - - - -		9	59
Time for the 5th of March - - - - - - - - - - - - - -	+	0	57
Time when Regulus passes the meridian, 5th March - -		10	56

2. Required the time on the 16th August, when α Lyra, or *Vega*, is on the meridian?

		h.	m.
Right ascension of *Vega* - - - - - - - - - - - - - - -		18	31
Time for 16th August - - - - - - - - - - - - - - - -	+	14	18
(Sum — 24 hours.) Time of Vega's passing the merid. 16th Aug.		8	49

TABLE III.

Correction to be subtracted from the Observed Altitude of a Fixed Star.

This table contains the Refraction in Altitude combined with the Dip of the Horizon; each correction is given to the nearest tenth of a minute, and is always to be subtracted ftom the observed altitude of a Star, in order to find the true altitude.

For example: let the observed altitude of a Star be 39° 41′ when the height of the observer's eye 18 feet above the sea: required the true altitude of the Star?

Star's observed altitude - - - -		39° 41′.0
Under 18 feet and opposite 40°, is	—	5.3
Star's true altitude - - - - - - -		39 35.7

Note.—Seconds are reduced to tenths of a minute, by dividing them by 6 · and tenths of a minute are turned into seconds, when multiplied by 6.

TABLE IV.

Apparent Time of the Passage of the North Pole Star over the Meridian of Greenwich, for every Day of the Year 1824.

When the time of the Polar Star's transit, over any other Meridian than Greenwich is required, the following corrections are to be applied to the time found in this table.

1. When the Longitude is *East* of Greenwich, from 0° to 45°, add 0m.; from 45° to 135°, add 1m.; from 135° to 180°, add 2m.

2. When the Longitude is *West* of Greenwich, from 0° to 45°, subtract 0m.; from 45° to 135°, subtract 1m.; from 135° to 180°, subtract 2m.

TABLE V.

Correction to be applied to the time that the Pole Star passes the Meridian in 1824; *to find the time of its passing in other years.*

The quantities in this Table are to be added to, or subtracted from, the time in Table IV., according as the sign + or — is affixed. For example; the time of the passage of the Pole Star, over the Meridian of Greenwich, on the 15th March, 1826, is required?

	h.	m.
Time in Table IV. for 15th March -	1	17
Corr. from Table V. for March, 1826	+	2
Time required on 15th March, 1826 -	1	19

TABLE VI.

Difference between the Altitudes of the Pole and the North Pole Star, observed at any given distance from the Meridian, in 1824.

TABLE VII.

Correction to be subtracted from the Quantities in Table VI., *for succeeding years.*

In the year 1824, the mean distance of the North Polar Star, from the Pole of the Equinoctial, is about 1° 37′ 35″, and for this distance the quantities in Table VI. are calculated; but as the Pole Star is approaching the Pole at the rate of 19½″ in a year, it is plain that these quantities must be diminished in the same ratio, when used after the year 1824; this may be done by Table VII. for the 8 succeeding years. For example; let the difference between the altitudes of the Pole and the Pole Star be required in 1831, when the distance of the Pole Star from the meridian is 1h. 48m.

Difference of alt. of Pole, and Pole Star, for 1h. 48m. in Table VI.	1° 27′
In Table VII. opposite 1831, and under 1° 26′, is - - - - - -	— 2
Difference required in 1831 - - - - - - - - - - - - - - - -	1 25

TABLE I.

Right Ascensions and Declinations of the Principal Fixed Stars, adapted to the *Beginning* of the Year 1824.

Names of the Stars.	Mag.	Right Ascension in Time.	Ann. Var. add.	Declination.	Ann. Var.	Situations of the Stars in their respective Constellations.
		H. M. S.	S.	° ′ ″	″	
γ Pegasus . . *Algenib*	2	0 4 11	3.1	14 12 20 N.	+ 20	Extremity of the Wing of *Pegasus*
α Phœnix	2.3	0 17 34	3.0	43 15 10 S.	– 20	In the Head of the *Phenix*
β Cetus	2.3	0 34 44	3.0	18 57 16 S.	– 20	In the Tail of the *Whale*
β Andromeda . *Mirach*	2	0 59 53	3.3	34 41 9 N.	+ 19	In the Girdle of *Andromeda*
α Eridanus . *Achernar*	1	1 31 8	2.2	58 7 58 S.	– 19	The Spring of the *River Erida*
α Aries . . . ARIETIS	2	1 57 16	3.4	22 37 34 N.	+ 17	In the Eastern Horn of the *Ram*
γ Cetus	3	2 34 11	3.1	2 29 38 N.	+ 16	In the Mouth of the *Whale*
α Cetus . . . *Menkar*	2	2 53 5	3.1	3 23 41 N.	+ 15	In the Jaw of the *Whale*
β Perseus . . . *Algol*	Var.	2 56 46	3.8	40 16 15 N.	+ 14	In the Head of *Medusa*
α Perseus	2	3 11 48	4.2	49 13 36 N.	+ 14	The bright Star in *Perseus*
α Taurus . ALDEBARAN	1	4 25 50	3.4	16 8 54 N.	+ 8	Southern Eye of the *Bull*
α Auriga . . *Capella*	1	5 3 42	4.4	45 48 29 N.	+ 5	In the left Shoulder of *Auriga*
β Orion . . . *Rigel*	1	5 6 5	2.9	8 24 40 S.	– 5	In the Western Foot of *Orion*
β Taurus	2	5 15 11	3.8	28 26 59 N.	+ 4	In the Northern Horn of the *Bull*
γ Orion . . . *Bellatrix*	2	5 15 42	3.2	6 10 59 N.	+ 4	In the Western Shoulder of *Orion*
α Columba	2	5 33 18	2.2	34 10 20 S.	– 2	Bright Star in the *Dove*
κ Orion	2.3	5 39 25	2.8	9 44 15 S.	– 2	In the Eastern Thigh of *Orion*
α Orion . . . *Betelguese*	1	5 45 39	3.3	7 21 59 N.	+ 1	In the Eastern Shoulder of *Orion*
α Argo Navis . *Canopus*	1	6 20 3	1.3	52 36 9 S.	+ 2	In the Poop of the *Ship Argo*
α Canis Major . . *Sirius*	1	6 37 24	2.6	16 28 48 S.	+ 4	In the Mouth of the *Great Dog*
δ Canis Major	2.3	7 1 15	2.4	26 7 14 S.	+ 5	In the Back of the *Great Dog*
η Canis Major	2.3	7 17 8	2.4	28 57 52 S.	+ 7	In the Tail of the *Great Dog*
α Gemini . . . *Castor*	1	7 23 22	3.8	32 15 56 N.	– 7	In the Head of the *Northern Twin*
α Canis Minor . *Procyon*	1.2	7 30 5	3.2	5 40 11 N.	– 9	In the Body of the *Little Dog*
β Gemini . . POLLUX	1	7 34 32	3.7	28 26 36 N.	– 8	In the Head of the *Southern Twin*
ζ Argo Navis	2	7 57 24	2.1	39 30 38 S.	+ 10	In the Row-lock of the *Ship Argo*
γ Argo Navis	2	8 4 8	1.8	46 49 11 S.	+ 10	In the Poop of the *Ship Argo*
δ Argo Navis	2	8 39 52	1.6	54 3 45 S.	+ 13	In the Middle of the *Ship Argo*
β Argo Navis	1	9 11 17	0.7	68 59 42 S.	+ 15	In the Oars of the *Ship Argo*
α Hydra . . *Alphard*	2	9 18 56	3.0	7 53 58 S.	+ 15	In the Heart of the female *Hydra*
α Leo . . . REGULUS	1	9 58 59	3.2	12 49 27 N.	– 17	In the Heart of the *Lion*
β Ursa Major	2	10 51 10	3.7	57 19 25 N.	– 19	Southern *Pointer* to Pole Star
α Ursa Major . . *Dubhe*	1.2	10 52 47	3.8	62 41 57 N.	– 19	Northern *Pointer* to Pole Star
β Leo . . . . *Deneb*	2	11 40 5	3.1	15 33 22 N.	– 20	In the Tail of the *Lion*
α Crux	1	12 16 54	3.2	62 7 29 S.	+ 20	In the Foot of the *Cross*
γ Crux	2	12 21 26	3.3	56 7 21 S.	+ 20	In the Top of the *Cross*
β Crux	2	12 37 30	3.4	58 43 33 S.	+ 20	In the Eastern Arm of the *Cross*
α Virgo . . . . SPICA	1	13 15 56	3.1	10 14 19 S.	+ 19	The Virgin's Spike
η Ursa Major *Benetnach*	2	13 40 36	2.4	50 11 42 N.	– 18	Point of the tail of the *Great Bear*
β Centaurus	2	13 51 30	4.1	59 31 2 S.	+ 18	In the Eastern Foot of the *Centaur*
α Draco	2.3	13 59 39	1.6	65 13 8 N.	– 17	In the Tail of the *Dragon*
α Bootes . . *Arcturus*	1	14 7 39	2.7	20 6 12 N.	– 19	The Bright Star in *Bootes*
α Centaurus	1	14 28 18	4.4	60 7 5 S.	+ 16	In the Eastern Foot of the *Centaur*
α Libra . . . *Zubenesch*	2.3	14 41 4	3.3	15 16 48 S.	+ 15	The Southern Scale of *Libra*
β Libra . . . *Zubenelg*	2.3	15 7 34	3.2	8 43 38 S.	+ 14	The Northern Scale of *Libra*
α Corona Borealis *Alphacca*	2	15 27 15	2.5	27 18 47 N.	– 12	Bright Star in the *Crown*
α Serpens	2	15 35 36	2.9	6 59 11 N.	– 12	In the Neck of the *Serpent*
α Scorpio . . ANTARES	1	16 18 37	3.6	26 1 50 S.	+ 9	In the Heart of the *Scorpion*
α Hercules *Ras Algethi*	2	17 6 38	2.7	14 35 56 N.	– 4	In the Head of *Hercules*
α Serpentarius *Ras Alhague*	2	17 26 46	2.8	12 41 47 N.	– 3	In the Head of *Ophiuchus*
γ Draco . . . *Rastaban*	2.3	17 52 31	1.4	51 30 48 N.	– 1	In the Head of the *Dragon*
α Lyra . . . . *Vega*	1	18 30 59	2.0	38 37 33 N.	+ 3	The Bright Star in the *Harp*
α Aquila . . ALTAIR	1.2	19 42 12	2.9	8 24 41 N.	+ 9	The Bright Star in the *Eagle*
α Pavo	1.2	20 11 40	4.8	57 17 19 S.	– 11	The Eye of the *Peacock*
α Cygnus . . . *Arided*	1.2	20 35 26	2.0	44 39 21 N.	+ 13	In the Tail of the *Swan*
α Cepheus . *Alderaimin*	3	21 14 22	1.4	61 50 31 N.	+ 15	In the W. Shoulder of *Cepheus*
α Grux	2	21 57 6	3.8	47 48 11 S.	– 17	In the W. Wing of the *Crane*
α Pisces Aust. FOMALHAUT	1	22 47 54	3.3	30 33 10 S.	– 19	In the Mouth of the *Southern Fish*
β Pegasus . . . *Scheat*	2	22 25 15	2.9	27 7 37 N.	+ 19	In the Shoulder of *Pegasus*
α Pegasus . . MARCAB	2	22 56 0	3.0	14 15 42 N.	+ 19	In the Wing of *Pegasus*
α Andromeda *Alpheratz*	2	23 59 19	3.1	28 17 10 N.	+ 20	In the Head of *Andromeda*

TABLE II.

TIME to be ADDED to the RIGHT ASCENSION of a STAR, to find the TIME of its PASSING the MERIDIAN on any day of the YEAR.

Days.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Days.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m	h. m.	h. m.	
1	5 14	3 2	1 12	23 18	21 27	19 25	17 20	15 15	13 19	11 31	9 35	7 31	1
2	5 10	2 58	1 8	23 15	21 23	19 20	17 16	15 11	13 16	11 28	9 31	7 27	2
3	5 6	2 54	1 4	23 11	21 20	19 16	17 12	15 8	13 12	11 24	9 27	7 23	3
4	5 1	2 50	1 1	23 7	21 16	19 12	17 8	15 4	13 8	11 20	9 23	7 18	4
5	4 57	2 46	0 57	23 4	21 12	19 8	17 4	15 0	13 5	11 17	9 19	7 14	5
6	4 52	2 42	0 53	23 0	21 8	19 4	17 0	14 56	13 1	11 13	9 15	7 9	6
7	4 48	2 38	0 50	22 56	21 4	19 0	16 56	14 52	12 58	11 9	9 11	7 5	7
8	4 44	2 34	0 46	22 53	21 0	18 56	16 51	14 48	12 54	11 6	9 7	7 1	8
9	4 39	2 30	0 42	22 49	20 56	18 52	16 47	14 45	12 50	11 2	9 3	6 56	9
10	4 35	2 26	0 39	22 45	20 52	18 47	16 43	14 41	12 47	10 58	8 59	6 52	10
11	4 31	2 22	0 35	22 42	20 49	18 43	16 39	14 37	12 43	10 55	8 55	6 47	11
12	4 26	2 18	0 31	22 38	20 45	18 39	16 35	14 33	12 40	10 51	8 51	6 43	12
13	4 22	2 14	0 27	22 34	20 41	18 35	16 31	14 29	12 36	10 47	8 47	6 39	13
14	4 18	2 10	0 24	22 31	20 37	18 31	16 27	14 26	12 32	10 44	8 43	6 34	14
15	4 13	2 6	0 20	22 27	20 33	18 27	16 23	14 22	12 29	10 40	8 39	6 30	15
16	4 9	2 2	0 17	22 23	20 29	18 23	16 19	14 18	12 25	10 36	8 35	6 25	16
17	4 5	1 58	0 13	22 20	20 25	18 18	16 15	14 14	12 22	10 32	8 30	6 21	17
18	4 0	1 55	0 9	22 16	20 21	18 14	16 11	14 11	12 18	10 29	8 26	6 17	18
19	3 56	1 51	0 6	22 12	20 17	18 10	16 7	14 7	12 14	10 25	8 22	6 12	19
20	3 52	1 47	0 2	22 9	20 13	18 6	16 3	14 3	12 11	10 21	8 18	6 8	20
21	3 48	1 43	23 58	22 5	20 9	18 2	15 59	14 0	12 7	10 17	8 14	6 3	21
22	3 43	1 39	23 55	22 1	20 5	17 58	15 55	13 56	12 4	10 14	8 10	5 59	22
23	3 39	1 35	23 51	21 57	20 1	17 53	15 51	13 52	12 0	10 10	8 5	5 54	23
24	3 35	1 32	23 47	21 54	19 57	17 49	15 47	13 48	11 56	10 6	8 1	5 50	24
25	3 31	1 28	23 44	21 50	19 53	17 45	15 43	13 45	11 53	10 2	7 57	5 45	25
26	3 27	1 24	23 40	21 46	19 49	17 41	15 39	13 41	11 49	9 58	7 53	5 41	26
27	3 23	1 20	23 37	21 42	19 45	17 37	15 35	13 37	11 46	9 54	7 48	5 37	27
28	3 18	1 17	23 33	21 39	19 41	17 33	15 31	13 34	11 42	9 51	7 44	5 32	28
29	3 14	1 14	23 29	21 35	19 37	17 29	15 27	13 30	11 38	9 47	7 40	5 28	29
30	3 10		23 26	21 31	19 33	17 24	15 23	13 27	11 35	9 43	7 35	5 23	30
31	3 6		23 22		19 29		15 19	13 23		9 39		5 19	31

TABLE III.

CORRECTION to be SUBTRACTED from the OBSERVED ALTITUDE of a FIXED STAR, to find the TRUE ALTITUDE.

*'s Obs. Alt.	HEIGHT OF THE EYE ABOVE THE SEA, IN FEET.														*'s Obs. Alt.
	4	6	8	10	12	14	16	18	20	22	24	26	28	30	
°	′	′	′	′	′	′	′	′	′	′	′	′	′	′	°
5	11.8	12.2	12.6	12.9	13.2	13.5	13.7	14.0	14.2	14.4	14.6	14.8	15.0	15.1	5
6	10.4	10.8	11.2	11.5	11.8	12.1	12.3	12.6	12.8	13.0	13.2	13.4	13.6	13.7	6
7	9.3	9.7	10.1	10.4	10.7	11.0	11.2	11.5	11.7	11.9	12.1	12.3	12.5	12.6	7
8	8.4	8.8	9.2	9.5	9.8	10.1	10.3	10.6	10.8	11.0	11.2	11.4	11.6	11.7	8
9	7.7	8.1	8.5	8.8	9.1	9.4	9.6	9.9	10.1	10.3	10.5	10.7	10.9	11.0	9
10	7.2	7.6	8.0	8.3	8.6	8.9	9.1	9.4	9.6	9.8	10.0	10.2	10.4	10.5	10
11	6.7	7.1	7.5	7.8	8.1	8.4	8.6	8.9	9.1	9.3	9.5	9.7	9.9	10.0	11
12	6.3	6.7	7.1	7.4	7.7	8.0	8.2	8.5	8.7	8.9	9.1	9.3	9.5	9.6	12
14	5.7	6.1	6.5	6.8	7.1	7.4	7.6	7.9	8.1	8.3	8.5	8.7	8.9	9.0	14
16	5.2	5.6	6.0	6.3	6.6	6.9	7.1	7.4	7.6	7.8	8.0	8.2	8.4	8.5	16
18	4.8	5.2	5.6	5.9	6.2	6.5	6.7	7.0	7.2	7.4	7.6	7.8	8.0	8.1	18
20	4.5	4.9	5.3	5.6	5.9	6.2	6.4	6.7	6.9	7.1	7.3	7.5	7.7	7.8	20
22	4.3	4.7	5.1	5.4	5.7	6.0	6.2	6.5	6.7	6.9	7.1	7.3	7.5	7.6	22
26	3.9	4.3	4.7	5.0	5.3	5.6	5.8	6.1	6.3	6.5	6.7	6.9	7.1	7.2	26
30	3.6	4.0	4.4	4.7	5.0	5.3	5.5	5.8	6.0	6.2	6.4	6.6	6.8	6.9	30
35	3.3	3.7	4.1	4.4	4.7	5.0	5.2	5.5	5.7	5.9	6.1	6.3	6.5	6.6	35
40	3.1	3.5	3.9	4.2	4.5	4.8	5.0	5.3	5.5	5.7	5.9	6.1	6.3	6.4	40
45	2.9	3.3	3.7	4.0	4.3	4.6	4.8	5.1	5.3	5.5	5.7	5.9	6.1	6.3	45
50	2.7	3.1	3.5	3.8	4.1	4.4	4.6	4.9	5.1	5.3	5.5	5.7	5.9	6.1	50
55	2.6	3.0	3.4	3.7	4.0	4.3	4.5	4.8	5.0	5.2	5.4	5.6	5.8	6.0	55
60	2.5	2.9	3.3	3.6	3.9	4.2	4.4	4.7	4.9	5.1	5.3	5.5	5.7	5.9	60
65	2.4	2.8	3.2	3.5	3.8	4.1	4.3	4.6	4.8	5.0	5.2	5.4	5.6	5.8	65
70	2.3	2.7	3.1	3.4	3.7	4.0	4.2	4.5	4.7	4.9	5.1	5.3	5.5	5.7	70
80	2.1	2.5	2.9	3.2	3.6	3.8	4.0	4.3	4.5	4.7	4.9	5.1	5.3	5.5	80
90	1.9	2.3	2.7	3.0	3.3	3.6	3.8	4.1	4.3	4.5	4.7	4.9	5.1	5.3	90

TABLE IV.

APPARENT TIME of the Passage of the NORTH POLE STAR over the MERIDIAN of GREENWICH for every day of the YEAR 1824.

Days.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Days.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	
1	6 13	4 1	2 8	0 15	22 20	20 18	18 14	16 10	14 14	12 26	10 30	8 26	1
2	6 8	3 57	2 4	0 11	22 16	20 14	18 9	16 6	14 10	12 22	10 26	8 22	2
3	6 4	3 53	2 1	0 8	22 13	20 10	18 5	16 2	14 7	12 19	10 22	8 18	3
4	6 0	3 49	1 57	0 4	22 9	20 5	18 1	15 58	14 3	12 15	10 18	8 13	4
5	5 55	3 45	1 53	23 57	22 5	20 1	17 57	15 54	13 59	12 12	10 14	8 9	5
6	5 51	3 41	1 50	23 53	22 1	19 57	17 53	15 50	13 56	12 8	10 10	8 5	6
7	5 47	3 37	1 46	23 49	21 57	19 53	17 49	15 46	13 52	12 4	10 6	8 0	7
8	5 42	3 33	1 42	23 46	21 53	19 49	17 45	15 43	13 48	12 1	10 2	7 56	8
9	5 38	3 29	1 39	23 42	21 49	19 45	17 41	15 39	13 45	11 57	9 58	7 51	9
10	5 33	3 25	1 35	23 38	21 45	19 41	17 37	15 35	13 41	11 53	9 54	7 47	10
11	5 29	3 21	1 31	23 35	21 42	19 36	17 33	15 31	13 38	11 50	9 50	7 43	11
12	5 25	3 17	1 28	23 31	21 38	19 32	17 29	15 27	13 34	11 46	9 46	7 38	12
13	5 21	3 13	1 24	23 27	21 34	19 28	17 25	15 24	13 31	11 42	9 42	7 34	13
14	5 16	3 9	1 20	23 24	21 30	19 24	17 21	15 20	13 27	11 38	9 38	7 29	14
15	5 12	3 5	1 17	23 20	21 26	19 20	17 17	15 16	13 24	11 35	9 34	7 25	15
16	5 8	3 1	1 13	23 16	21 22	19 16	17 13	15.12	13 20	11 31	9 30	7 21	16
17	5 3	2 57	1 9	23 13	21 18	19 12	17 9	15 9	13 16	11 27	9 25	7 16	17
18	4 59	2 54	1 6	23 9	21 14	19 7	17 5	15 5	13 13	11 24	9 21	7 12	18
19	4 55	2 50	1 2	23 5	21 10	19 3	17 1	15 1	13 9	11 20	9 17	7 7	19
20	4 51	2 46	0 58	23 2	21 6	18 59	16 57	14 57	13 6	11 16	9 13	7 3	20
21	4 46	2 42	0 55	22 58	21 2	18 55	16 53	14 54	13 2	11.12	9 9	6 58	21
22	4 42	2 38	0 51	22 54	20 58	18 51	16 49	14 50	12 58	11 8	9 5	6 54	22
23	4 38	2 34	0 48	22 51	20 54	18 47	16 45	14 46	12 55	11 5	9 1	6 50	23
24	4 34	2 31	0 44	22 47	20 50	18 43	16 41	14 43	12 51	11 1	8 56	6 45	24
25	4 30	2 27	0 40	22 43	20 46	18 38	16 37	14 39	12 48	10 57	8 52	6 41	25
26	4 25	2 23	0 37	22 39	20 42	18 34	16 33	14 36	12 44	10 53	8 48	6 36	26
27	4 21	2 19	0 33	22 35	20 38	18 30	16 29	14 32	12 40	10 49	8 43	6 32	27
28	4 17	2 16	0 29	22 32	20 34	18 26	16 25	14 28	12 37	10 45	8 39	6 27	28
29	4 13	2 12	0 26	22 28	20 30	18 22	16 21	14 25	12 33	10 42	8 35	6 23	29
30	4 9		0 22	22 24	20 26	18 18	16 17	14 21	12 30	10 38	8 31	6 18	30
31	4 5		0 19		20 22		16 13	14 17		10 34		6 14	31

TABLE V.

CORRECTION to be applied to the PASSAGE of the POLE STAR over the MERIDIAN in the YEAR 1824, to find the Time of its PASSING in the following YEARS.

Years.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Years.
	m.	m.	m.	m.	m.	m.	m.	m.	m.	m.	m.	m.	
1825	− 3	− 3	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	1825
1826	− 2	− 2	2	2	2	2	2	2	2	2	2	2	1826
1827	− 1	− 1	4	4	4	4	4	4	4	4	4	4	1827
1828	+ 1	+ 1	1	1	1	1	1	1	1	1	1	1	1828
1829	− 2	− 2	+ 2	+ 2	+ 2	+ 2	+ 2	+ 2	+ 2	+ 2	+ 2	+ 2	1829
1830	− 1	− 1	3	3	3	3	3	3	3	3	3	3	1830
1851	− 0	− 0	5	5	5	5	5	5	5	5	5	5	1831
1832	+ 2	+ 2	2	2	2	2	2	2	2	2	2	2	1832

TABLE VI.

DIFFERENCE between the ALTITUDES of the POLE, and the NORTH POLE STAR, observed at any GIVEN DISTANCE from the MERIDIAN, in the Year 1824.

SUBTRACT.

When Pole Star is past the Meridian.

M.	0h.	1h.	2h.	3h.	4h.	5h.	
	° ′	° ′	° ′	° ′	° ′	° ′	
0	1 38	1 34	1 24	1 9	0 49	0 25	60
2	1 38	1 34	1 24	1 8	0 48	0 24	58
4	1 38	1 34	1 24	1 8	0 47	0 24	56
6	1 38	1 34	1 23	1 7	0 47	0 23	54
8	1 38	1 33	1 23	1 6	0 46	0 22	52
10	1 38	1 33	1 22	1 6	0 45	0 21	50
12	1 37	1 33	1 22	1 5	0 44	0 20	48
14	1 37	1 32	1 21	1 5	0 44	0 19	46
16	1 37	1 32	1 21	1 4	0 43	0 19	44
18	1 37	1 32	1 20	1 3	0 42	0 18	42
20	1 37	1 32	1 20	1 3	0 41	0 17	40
22	1 37	1 31	1 19	1 2	0 40	0 16	38
24	1 37	1 31	1 19	1 1	0 40	0 15	36
26	1 37	1 31	1 18	1 1	0 39	0 14	34
28	1 37	1 30	1 18	1 0	0 38	0 14	32
30	1 37	1 30	1 17	0 59	0 37	0 13	30
32	1 37	1 30	1 17	0 59	0 37	0 12	28
34	1 37	1 29	1 16	0 58	0 36	0 11	26
36	1 36	1 29	1 16	0 57	0 35	0 10	24
38	1 36	1 29	1 15	0 57	0 34	0 9	22
40	1 36	1 28	1 15	0 56	0 33	0 9	20
42	1 36	1 28	1 14	0 55	0 33	0 8	18
44	1 36	1 28	1 14	0 55	0 32	0 7	16
46	1 36	1 27	1 13	0 54	0 31	0 6	14
48	1 35	1 27	1 12	0 53	0 30	0 5	12
50	1 35	1 26	1 12	0 52	0 29	0 4	10
52	1 35	1 26	1 11	0 52	0 29	0 3	8
54	1 35	1 26	1 11	0 51	0 28	0 3	6
56	1 35	1 25	1 10	0 50	0 27	0 2	4
58	1 34	1 25	1 10	0 50	0 26	0 1	2
60	1 34	1 25	1 9	0 49	0 25	0 0	0
	23h.	22h.	21h.	20h.	19h.	18h.	M.

When Pole Star is past the Meridian.

SUBTRACT.

ADD.

When Pole Star is past the Meridian.

M.	12h.	13h.	14h.	15h.	16h.	17h.	
	° ′	° ′	° ′	° ′	° ′	° ′	
0	1 38	1 34	1 24	1 9	0 49	0 25	60
2	1 38	1 34	1 24	1 8	0 48	0 24	58
4	1 38	1 34	1 24	1 8	0 47	0 24	56
6	1 38	1 34	1 23	1 7	0 47	0 23	54
8	1 38	1 33	1 23	1 6	0 46	0 22	52
10	1 38	1 33	1 22	1 6	0 45	0 21	50
12	1 37	1 33	1 22	1 5	0 44	0 20	48
14	1 37	1 32	1 21	1 5	0 44	0 19	46
16	1 37	1 32	1 21	1 4	0 43	0 19	44
18	1 37	1 32	1 20	1 3	0 42	0 18	42
20	1 37	1 32	1 20	1 3	0 41	0 17	40
22	1 37	1 31	1 19	1 2	0 40	0 16	38
24	1 37	1 31	1 19	1 1	0 40	0 15	36
26	1 37	1 31	1 18	1 1	0 39	0 14	34
28	1 37	1 30	1 18	1 0	0 38	0 14	32
30	1 37	1 30	1 17	0 59	0 37	0 13	30
32	1 37	1 30	1 17	0 59	0 37	0 12	28
34	1 37	1 29	1 16	0 58	0 36	0 11	26
36	1 36	1 29	1 16	0 57	0 35	0 10	24
38	1 36	1 29	1 15	0 57	0 34	0 9	22
40	1 36	1 28	1 15	0 56	0 33	0 9	20
42	1 36	1 28	1 14	0 55	0 33	0 8	18
44	1 36	1 28	1 14	0 55	0 32	0 7	16
46	1 36	1 27	1 13	0 54	0 31	0 6	14
48	1 35	1 27	1 12	0 53	0 30	0 5	12
50	1 35	1 26	1 12	0 52	0 29	0 4	10
52	1 35	1 26	1 11	0 52	0 29	0 3	8
54	1 35	1 26	1 11	0 51	0 28	0 3	6
56	1 35	1 25	1 10	0 50	0 27	0 2	4
58	1 34	1 25	1 10	0 50	0 26	0 1	2
60	1 34	1 25	1 9	0 49	0 25	0 0	0
	11h.	10h.	9h.	8h.	7h.	6h.	M.

When Pole Star is past the Meridian.

ADD.

TABLE VII.

CORRECTIONS to be subtracted from the QUANTITIES in TABLE VI. for the following YEARS.

Arg. Years	Argument. Quantity in Table VI																		Arg. Years.
	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	′	′	′	′	′	′	′	′	
	1 38	1 34	1 30	1 26	1 22	1 18	1 14	1 10	1 5	1 0	55	50	45	40	30	20	10	0	
1825	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1825
1826	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1826
1827	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1827
1828	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1828
1829	2	2	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1829
1830	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	0	0	0	1830
1831	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	0	0	0	1831
1832	3	3	2	2	2	2	2	2	2	2	1	1	1	1	1	1	0	0	1832

Errata.

Page 5, line 5 from the bottom, *for* it, *read* its.

——- 7, line 1 from the top, the Log. of the Moon's hor. par. should have been 0.0244 instead of 0.0240.

——- 8, line 2 from the top, *for* 21° 9″ *read* 21° 9′

——- 8, in Exam. 13, *for* App. Dist. 51° 28′ 25″ *read* 51° 28′ 35″.

——- 26, line 5 from the bottom, *for* direction *read* directions.

——- 48, line 25 from the top, *for* Log. T, 4,8522 *read* 0,8522.

——- 6, of the APPENDIX, line 14, after the word Aldebaran insert a Colon.

THE INVENTOR OF THE

LONGITUDE SCALE

Has received the following TESTIMONIALS of its utility, which he begs leave to submit to the attention of those NAVIGATORS who may not have an opportunity of examining the instrument.

Fleet Street, May 19, 1823.

SIR,

I HAVE duly considered your Longitude Scale and Book of Instructions, and in many examples have, by means of them, reduced the apparent distance, and brought out the time from altitudes of the Sun and Stars. I do not, therefore, now hesitate to say that your Method is not only more accurate and convenient than any other mechanical means hitherto devised, but also, that it approaches sufficiently near to the correctness of the best ways of computation. In the hands of every one, your operation will be performed in less time, and in those of seamen in general, it will, in my opinion, be attended with less liability to mistake. From my knowledge of nautical instruments, I must say that no seamen can with certainty get the Apparent Distance nearer than 15″; and as far as I have tried your apparatus I have always come within one *fifth* part of that quantity. I certainly am not an enemy to the rigorous computation, and to *the few* who are capable of performing it, nothing that I may say can divert them from its employment; but, on the other hand, a method like your's, that is adapted to the avocations and educations of *the many*, ought not in my opinion to be treated with neglect.

Under this view of the subject, my sincere wishes for the success of your zealous and laudable endeavours to improve nautical science accompany this; and recommendations of your method upon all proper occasions shall not be wanting.

I am, Sir,

Your disinterested friend,

EDWARD TROUGHTON.

To Capt. D. Thomson.

Hydrographical Office, East India House,
May 13, 1823.

SIR,

Being highly sensible of the value of your Lunar Scale, as affording to navigators a simple and speedy method of clearing the lunar distances from the effects of Parallax and Refraction, and now farther improved by your late alteration in simplifying the cases, and rendering the auxilary Tables plain and easy to be apprehended by every person of common capacity, I have therefore thought it a duty incumbent on me, to recommend it strongly to the Commanders and Officers in the Honourable East India service, which I shall have great pleasure in doing at every favourable opportunity.

SIR,

I am your's, very sincerely,

JAMES HORSBURGH.

To Capt. D. Thomson.

30, Albemarle Street, London,
January 17th, 1823.

This is to certify, that during the last four years, whilst placed in the command of several of his majesty's ships, I have been in the habit of using the Longitude Scale, invented by David Thomson, for correcting the Lunar Distances.

And I do not hesitate to assert that this Scale, as a lunar corrector, will be found to be of the greatest utility by all practical navigators, in not only affording an immediate and satisfactory proof, respecting the correctness of the calculations by logarithms, but I have ever found the result to correspond so nearly with that deduced from other methods, as to induce me to place the most implicit confidence in it, on all common or ordinary occasions.

Since my return from the East Indies in July last, in the command of his majesty's ship Samarang, I have had an opportunity of examining the improvements made in the construction of this scale, by the inventor Mr. Thomson, which enables the calculator to obtain by this means, as near an approximation to the truth, in a fourth part of the time, as can possibly be procured by any other known method.

Given under my hand this 17th of January, 1823.

J. N. CAMPBELL.

Bury Street, Edmonton, 19th of May, 1823.

I HAVE worked several samples of reductions of Lunar Distances with Captain Thomson's Scale, and find the improvements he has made in it to very much shorten and simplify the operation; the reduced distance in all the cases I have tried has never exceeded four or five seconds from that derived by a strict logarithmetic calculation, and it appears to me that nothing can tend so much to facilitate the introduction of Lunar Observations generally at sea, as the use of this scale, which may be taught in half an hour to any person, acquainted only with the first four rules of Arithmetic. The invention of this instrument merits the highest praise on the ingenuity of its Author, as does its improvement on his industry and perseverance, and who cannot fail ultimately of obtaining that reward from its general introduction which his merit and its importance deserves.

THOMAS FIRMINGER, L.L.D.

Many years Assistant Astronomer at the
Royal Observatory, Greenwich.

148, Leadenhall Street, May 21st, 1823.

To Captain David Thomson,

SIR,

I HAVE with much pleasure examined your "Longitude Scale" by the test of several examples deduced from the Observations of Mr. Crossley, late of the Royal Observatory, at Greenwich: and by comparing the results, (the true distances) deduced by Taylor's Logarithms therefrom, with those obtained by means of your Scale, I have in no instance found them to differ more than from two to four seconds of a degree, and in several instances the results were quite exact: I can consequently strongly recommend it, not only for its accuracy, but for the very short and simple means its affords the Mariner to determine the Longitude by the Lunar Method.

I am, Sir,

Your most obedient Servant,

THOMAS LYNN,

Teacher of Navigation and Nautical Astronomy,
and Examiner of Officers in the Service of
the Hon. East India Company.

91, Drury Lane, 22nd May, 1823.

SIR,

I HAVE now carefully examined your Longitude Scale, or Lunar Corrector, and I am happy to inform you that I esteem it a most valuable addition to the Instruments now in use for determining the Longitude of a Ship at sea.

The facility with which the operations of clearing the Observed Distance, and finding the Apparent Time, may be performed by your Scale, would render it highly useful even were the results less accurate than they are; but when these results are invariably found to correspond so nearly with those obtained by a laborious calculation, it cannot fail to be of the greatest advantage to all who may employ it, either in clearing the Distance or finding the Time.

The results of the operations which I have performed by it, are almost the same as those obtained by the most rigid calculation; and, I have not the smallest doubt, from what I have seen of it, but the Corrected Distances obtained by your Scale will, in all cases be found not to differ above *three seconds* of a *degree* from what would be obtained by performing the same examples by Spherical Trigonometry.

After what I have now said of your valuable invention, I shall merely add, that I am of opinion, that it only requires to be known, to such seamen as are in the practice of determining the Longitude, at sea, by the Lunar distances, in order to be employed by them in correcting those Distances, and determining the exact Time at which they were observed.

Trusting that you will soon have the satisfaction of seeing your Scale meet with the approbation of the intelligent part of your brethren, and its value appreciated as it ought to be, by all who take any interest in the improvement of Navigation, I beg leave to assure you that

I am, Sir,

Your most obedient Servant,

GEO. G. CAREY,

Teacher of Mathematics and Astronomy.

To Capt. D. Thomson.

THE SCALE

Is made and sold by Mr. BATE, Mathematical Instrument Maker,
17, Poultry.

And may be had of all Dealers in Nautical Books and Instruments.

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